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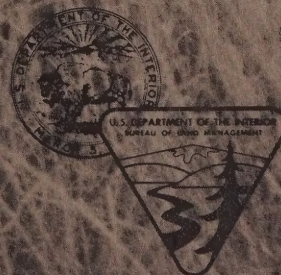
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FORT UNION COAL

BLOOMFIELD TRACT

SEPTEMBER 1981

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FORT UNION COAL REGION

BLOOMFIELD TRACT ANALYSIS

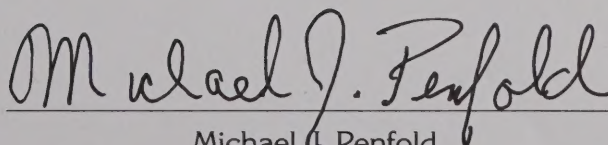
SITE SPECIFIC ANALYSIS

PRELIMINARY FACILITY EVALUATION REPORT

DAWSON COUNTY, MONTANA

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September 1981



Michael J. Penfold
State Director

PREFACE

This document contains a site-specific analysis and a preliminary facility evaluation report. The site-specific analysis discusses the consequences of leasing and mining a particular tract. The preliminary facility evaluation report discusses significant issues associated with an end use coal conversion facility.

There were 24 tracts identified through a screening process under the over-all direction of the Fort Union Region Coal Team. The team consists of federal, state, and local officials. The tracts are being evaluated for potential federal coal leasing for a coal lease sale scheduled for June 1983. The evaluation, called a site-specific analysis, has been completed for each of the 24 tracts.

Historically, development of a new coal mine in the Fort Union Coal Region has been associated with a coal conversion facility power plant in the vicinity of the mine. For this reason, the Regional Coal Team directed BLM to evaluate impacts of a typical facility near each potential mine. A preliminary facility evaluation report was prepared for each facility.

The Fort Union Regional Coal Team will begin ranking and grouping selected tracts into alternative leasing patterns for the 1983 lease sale using information from these individual reports. These groupings of tracts will form the basis for alternatives and a regional environmental impact statement to be developed during 1982. The analysis in this report represents an important step in a lengthy process which takes place prior to any final decision on federal coal leasing within the region.

Of the 24 tracts currently being evaluated, 16 would require the opening of new mines. One of the 16 would be specifically earmarked for small business. The remaining eight tracts constitute coal which would be needed to maintain production or prevent the by-pass of federal coal at an ongoing mining operation.

Approximately 1.6 billion tons of recoverable federal coal lie within the areas being evaluated. Final designation of some areas as unsuitable for mining under the 1977 Surface Mining Control and Reclamation Act will likely reduce the amount of federal coal actually available for leasing and development, and could remove several of the 24 tracts from further consideration. This information will not be available until early 1982.

A major purpose of the site-specific analysis and preliminary facility evaluation reports is to acquaint the public with key issues and consequences of leasing and development of federal coal reserves so that they may (1) offer comments to the Fort Union Regional Coal Team on what areas they consider most important to be evaluated and analyzed in the ranking of the tracts and in the Regional EIS and (2) offer specific advice on what decision alternatives the Coal Team should look at more closely.

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INTRODUCTION

SITE SPECIFIC ANALYSIS

INTRODUCTION

The purpose of this action is to offer strippable federal coal reserves that can be further considered for coal leasing and development to help meet the energy needs of the Nation.

This site specific environmental analysis has been prepared for the Bloomfield tract (see Map 1) in accordance with federal regulations (43 CFR 3420). It will be used by the Fort Union Regional Coal Team to further consider competitive leasing of federal coal within the tract for a June 30, 1983, coal lease sale schedule. If selected and leased, the Bloomfield tract will contribute 135.9 million tons of federal coal to the regional leasing target. Presently, a regional leasing target has not been established by the Secretary of the Interior. The preliminary regional leasing target will be established in August 1981 and finalized in October 1981.

BACKGROUND

In September of 1979, the Miles City District BLM Office completed the Redwater Management Framework Plan (MFP) for Dawson, McCone, Richland and Wibaux counties. The land use planning process included applying unsuitability criteria as much as possible, multiple-use conflict evaluation, and surface owner consultations. As a result of that work, areas were identified that could be further considered for coal development. The areas are available for consideration for new competitive leasing, leasing by exchanging and modifying existing leases (see Map 1).

Following land-use planning, the BLM requested expression of leasing interest which, along with other information, guided the USGS in delineating this tract. Results of that work are summarized in this profile.

Personnel from BLM's Miles City District inventoried the tract to determine the site-specific resource values and then analyzed potential environmental effects of coal development on this individual tract. Among other items, the unsuitability criteria (43 CFR 3461) were reconsidered on this site-specific basis. Any new findings of unsuitability are reflected in this report.

To be further considered for new competitive leasing, the tract will be presented to the Regional Coal Team who will rank and select tracts for a proposed lease sale schedule. The proposed lease sale tracts are then analyzed in a regional environmental impact statement (EIS). The EIS will analyze the site-specific and regional cumulative effects of coal leasing and development. Alternatives addressed in the EIS will include different combinations of tracts that meet a regional coal leasing target. The analysis of those groups of tracts could result in different impacts than the assessment made in

this document for this specific tract. During the process this preliminary tract could be modified. Ultimately, the Secretary will select specific tracts for lease sale. If the tract is leased, the lessee will be required to submit a plan for mining and reclamation to the Secretary of the Interior, Office of Surface Mining (OSM) for review and approval within three years after leasing. Once a mining plan has been submitted, OSM will review the proposed developments of the mining plan. OSM will prepare a site-specific environmental assessment or EIS prior to approval of the mining plan.

Development of the tract is in accordance with the Federal Coal Management program adopted by the Secretary of the Interior in June 1979. Basis of the program was, in part, the Final Environmental Statement for the Federal Coal Management Program. Implementation procedures are contained in Title 43—Code of Federal Regulations—Part 3400 (43 CFR 3400). Authorizing actions are the Mineral Leasing Act of 1920, as amended; The Mineral Leasing Act for Acquired Lands of 1947, as amended; the Federal Land Policy and Management Act of 1976; the Surface Mining Control and Reclamation Act of 1977; the Multiple Mineral Development Act of 1954; the Department of Energy Organization Act of 1977; the National Environmental Policy Act of 1969; the Federal Coal Leasing Amendments Act of 1976; as amended; and federal regulations concerning federal coal leasing and development including 43 CFR 3400; 30 CFR 211; and 30 CFR 700-899.

TRACT DELINEATION REPORT SUMMARY

The Bloomfield tract is located in the Great Plains physiographic province and lies approximately six miles north of Bloomfield and ten miles south of Richey in northern Dawson County, Montana. The tract contains one economical recoverable seam (the Pust bed) of lignite coal.

The seam divides into two benches, an upper thick one, and a lower bench which has one or more partings in the tract. The seams range from 14 to 30 feet thick, with overburden ranging from less than 150 feet to 200 feet in depth. There are no known geological hazards to surface mining in the Bloomfield tract.

The generic mining plan calls for a surface mine using draglines, electric shovels, bottom-dump coal haulers, scrapers and other support equipment. A possible mining sequence for analysis purposes is shown on Map 2. The coal would thus be mined to a depth of 200 feet or until the limiting stripping ratio (20:1) has been reached. The plan indicates the most probable use of the coal would be an on-site synthetic fuel plant.



PRELIMINARY TRACTSRedwater and Golden Valley

 KRCRA Areas

 Tract Delineation Areas

1 Circle

2 Burns Creek-
Thirteen Mile Creek

3 Southwest Glendive

4 Wibaux-Beach

① Circle I

② Circle II

③ Circle III

④ Redwater I

⑤ Redwater II

⑥ Southwest Glendive

⑦ Bloomfield

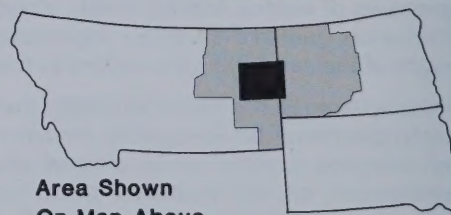
⑧ Central Bloomfield

⑨ Burns Creek

⑩ North Wibaux-Beach

⑪ South Wibaux-Beach

Total Ft. Union Coal Region



Area Shown
On Map Above

★ Savage Mine

Specific Tract Characteristics:

Acreage:		
Surface:	Federal	0
	State	600
	Private	12,292
	Total:	12,892
Coal:	Federal	4,145
	State	1,240
	Private	7,507
	Total	12,892

Coal Reserves/Millions of Tons:

In Place:	Federal	150.0
	State	46.6
	Private	269.7
	Total	467.3
Recoverable:	Federal	135.9
	State	41.9
	Private	242.7
	Total:	420.6

Coal Quality: Average of samples as received from vicinity of tract:

Moisture	32.4%
Ash	10.6%
Volatile matter	28.6%
Sulfur	0.9%*
Fixed carbon	28.3%
BTU's/lb	6,698

*Contained microveins of pyrite

Surface Disturbance/acres

Mining: Annual rate, 386; Total Life of Mine, 11,583

Haul Roads: 137

Mine Facilities: 160 - may include: changehouse, office warehouse, equipment repair shops, fuel, water and explosive storages, equipment and employee parking lots.

Stripping Ratio: Less than or equal to 20 to 1

Coal Thickness: Range 14 ft. to 30 ft.; average, 23.0

Mine Employment:

Construction Phase - 175 employees

Production Phase - 500 employees (maximum)

Annual Royalties and Severance Taxes:

Federal Royalty, \$3.39 million

State Royalty, \$1.05 million

State Severance Tax, \$16.80 million.

Water Needs:

Human Consumption, 15,000 gal./day

Source: Well water

Nonpotable, 120,000 gal./day

Source: Yellowstone River

Relocation of Right-of-Way:

4.5 miles of high pressure natural gas pipeline

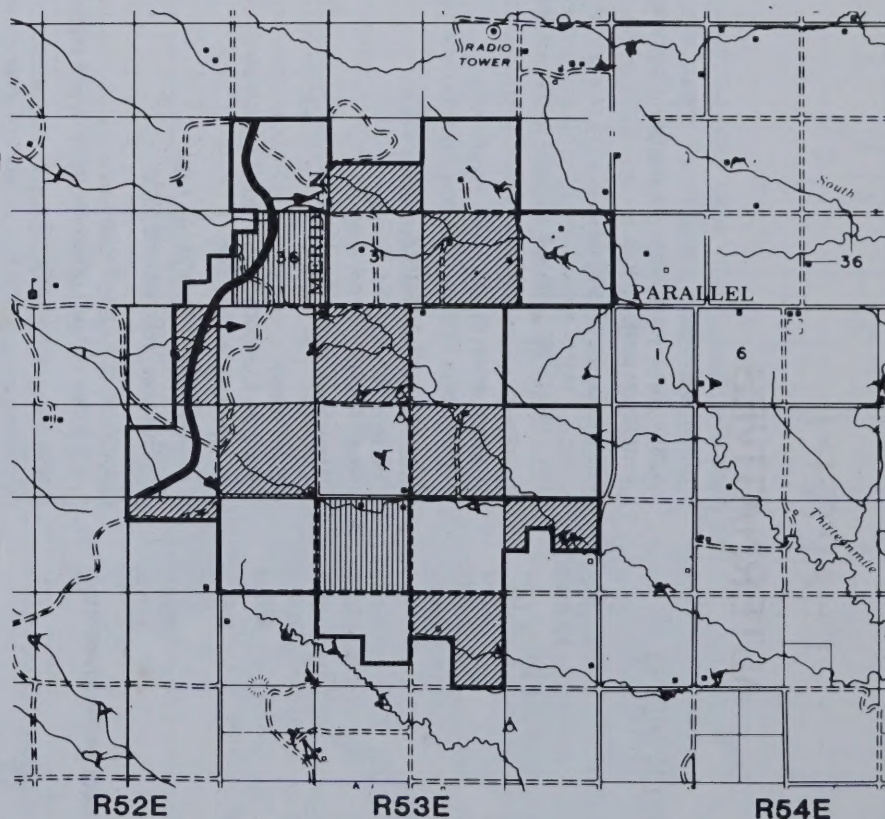
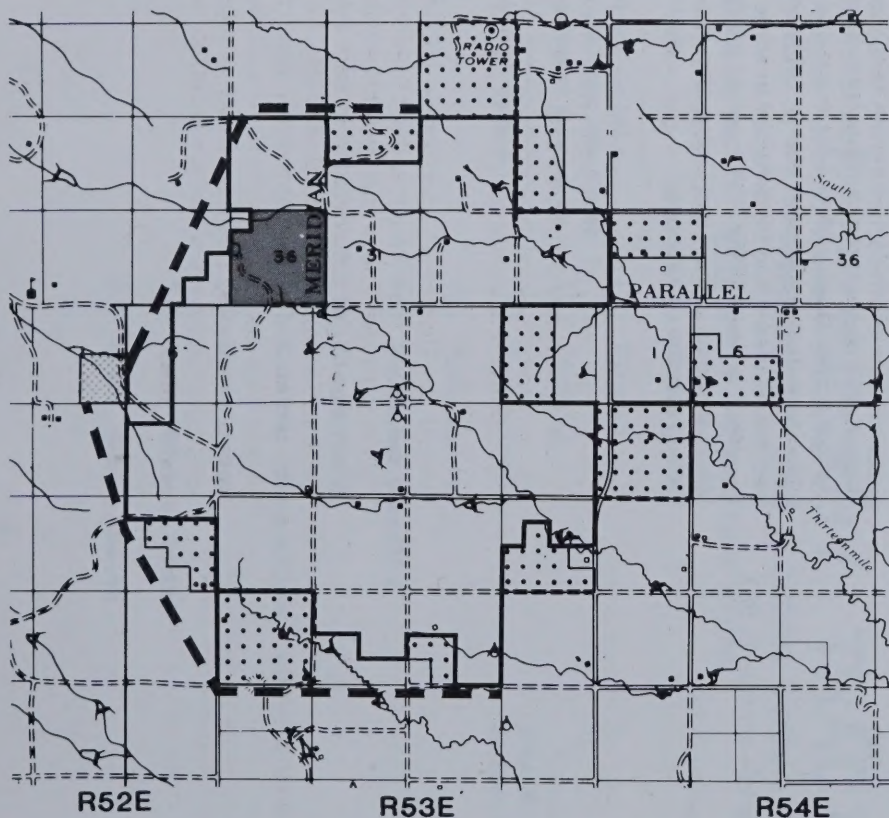
For more specific information on the proposed mining operation, refer to the Engineering, Geologic and Land Reports prepared by the USGS Tract Delineation Team.

NOTE: As the mine plans developed by USGS are of a generic nature and the actual mining sequence will be developed by the mining companies to fit their individual needs, the Resource Specialist assigned to the SSAs made the assumption that all lands within the tract boundaries would be disturbed to some degree. Therefore, acreage in the SSA may not always agree with that shown in the Tract Delineation Report concerning acreage disturbance.

BLOOMFIELD TRACT

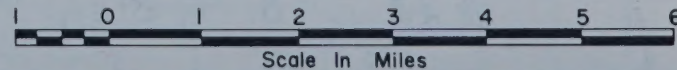
SURFACE

SUBSURFACE



LEGEND

- | | | | | | |
|---|---------------------------|---|--------------|---|-----------------------|
|  | State Surface |  | Federal Coal |  | Surface Facilities |
|  | Private Surface |  | State Coal |  | Out-of-Pit Haul Roads |
|  | Surface Owner Nonconsents |  | Private Coal |  | Pit Advancement |
|  | Tract Boundary | | | | |



CHAPTER I

ALTERNATIVES

LEASING AND DEVELOPMENT

This alternative is to offer for further consideration federal coal in the Bloomfield tract for competitive leasing. This tract has been identified as a logical mining unit for a 30-year surface mining operation.

The tract does not include any lands for which the surface owner has filed a valid nonconsent to mining prior to March 1, 1981. Unsuitability criteria numbers 1, 2, 4 through 6, 8, 16 through 18, and 20, as defined in the federal regulations CFR Subpart 3461 has been fully applied to the private surface over federal coal. Criteria numbers 9 through 15 involving fish and wildlife are pending further study. This criteria will be applied prior to the Final EIS as the information becomes available. Criterion 3 involving buffer zones along rights-of-way and adjacent to dwellings must be resolved prior to mining. Criterion 7 will be cleared through mine plan submission, which will include mitigation or avoidance measures. Criterion 19 will be determined by the Office of Surface Mining. Current unsuitability concerns are shown on Map 3. These unsuitability criteria are listed as follows:

- (1) Federal Land System
- (2) Rights-of-Way and Easements
- (3) Buffer Zones along R/W and Adjacent to Communities and Buildings
- (4) Wilderness Study Areas
- (5) Scenic Areas
- (6) Lands Used for Scientific Studies
- (7) Historic Lands and Sites
- (8) Natural Areas
- (9) Federally Listed Endangered Species
- (10) State Listed Endangered Species
- (11) Bald and Golden Eagle Nests
- (12) Bald and Golden Eagle Roost and Concentration Areas
- (13) Falcon Cliff Nesting Sites
- (14) Migratory Birds
- (15) State Resident Fish and Wildlife
- (16) Floodplains
- (17) Municipal Watersheds
- (18) National Resource Waters
- (19) Alluvial Valley Floors
- (20) State Proposed Criteria

Relationship to Other Developments

The tract contains two small inactive mines which went out of production in 1968. The nearest active mine is the Savage Mine located 20 miles east of the tract.

Production of the Savage mine is about 0.3 million tons annually. The tract lies on the western flank of the Williston Basin oil and gas field. All of the federal lands within the tracts are subjected to oil and gas leases. No active leases or wells are located in the tract. Farming and ranching are the only other significant activities in or near the tract.

Mitigation Measures

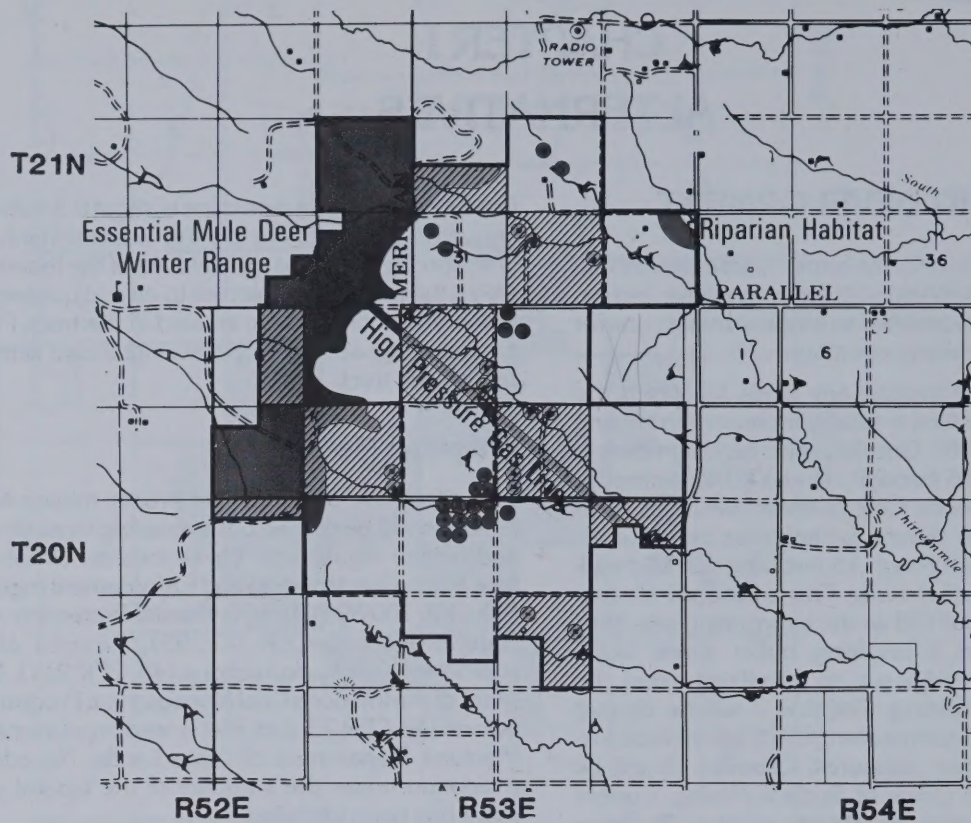
This alternative assumes that proper mining and reclamation will be carried out according to existing state and federal regulations. These include: Office of Surface Mining Reclamation and Enforcement regulations (30 CFR 700-899), Environmental Protection Agency regulations (40 CFR 0-1399), Council of Environmental Quality regulations (40 CFR 211), Department of the Interior's Coal Management Program regulations (43 CFR 23 and 3400), and regulations of the Montana Department of State Lands. No additional mitigation under the authority of the federal government has been identified.

NO LEASING ALTERNATIVE

Federal coal would not be offered for leasing under this alternative. Federal reserves represents about 32 percent and State reserves about 10 percent of the coal available in the tract. If federal coal is not leased, development of a large economical mining unit is not feasible (Ref. GS Bloomfield PLMU).

Three small mines located just east of the tract are no longer active and two small mines within the tract ceased production in 1968. There were no small business expressions of leasing interest for the area. Considering the amount of federal coal involved, the checkerboard pattern of federal coal ownership and the apparent trend in small mine development, near future development of any small coal mines in the tract boundary is not likely.

Should the Bloomfield tract not be considered for further leasing, there would be about 9 percent or (136 million tons) less federal coal available within the Fort Union Region for consideration in tract selection to meet the federal leasing target. Also about 42 million tons of State and 243 million tons of private coal would be lost for possible production in the region. As discussed in Chapter II, few significant changes to the existing environment would be expected during the next 30 years.



LEGEND

Areas that may be declared unsuitable for surface mining based on existing information.

- By BLM
- By Others
- Federal Coal
- o
 Potential Dwellings

BLOOMFIELD TRACT

CHAPTER II

AFFECTED ENVIRONMENT

This section is a description of the current environment with anticipated changes from ongoing trends. Within the Williston Basin there has been an increase in oil and gas exploration and this trend is expected to continue. The physical resources described in this section represent only existing conditions while the social and economic sections account for existing conditions and ongoing trends. It is recognized that the physical resource values may change due to future oil and gas exploration.

TOPOGRAPHY

Surface expression varies from breaks and badlands on the western edge of the tract (Figure 1) to gently rolling crop and grassland interrupted by an occasional butte in the remainder of the area. Elevations range from 2660 feet to 3025 feet. Drainage is toward the east through tributaries of Thirteen Mile Creek.

GEOLOGY

The area is underlain by sandstone, shale, and lignite beds belonging to the Tongue River Member of the Fort Union Formation (Paleocene). Some of the higher divides in the area are capped by Flaxville Gravel (Miocene/Pliocene).

Although no discoveries of other minerals have been made within the tract, the area is underlain by formations that are prospectively valuable for oil and gas. No other mineral values are known to occur within the tract.

SOILS AND RECLAMATION POTENTIAL

Soils within the tract are formed in weakly consolidated sandstone alluvium and glacial till. The soils occur along steep, dissected sedimentary plains, undulating and hilly sedimentary plains and nearly level to rolling high terraces, on uplands. Profile development and depths vary due to climate, parent material and geomorphic stability.

There are 33 soil series in the tract surveyed by the Soil Conservation Service at level two. Table 1 identifies erosion potential, soil reconstruction potential, etc., for the soils within the tract.

HYDROLOGY

Surface Water

The tract is drained principally by Thirteen Mile Creek and an unnamed tributary to Thirteen Mile Creek (see Map 2) both of which have only intermittent flow (estimated to occur 30 days or less per year). Thirteen Mile Creek is a tributary to the Yellowstone River, about 22 miles southeast of the eastern Bloomfield tract boundary. Flow and flood peaks result from summer thunderstorms and from snowmelt in February through April.

Thirteen Mile Creek drains about 12 square miles upstream of the eastern tract boundary. Its annual yield is estimated to be 220 acre-feet (AF) (average annual runoff of 0.35 inches) and the 10-year peak flow, anticipated at least once in a 10-year period, is estimated to be 370 cubic feet per second (cfs). An unnamed tributary drains the central and southern part of the tract. The estimated annual yield, from about 8 square miles, is 150 AF. The 10-year peak flow is 300 cfs.

Flow in Thirteen Mile Creek and its tributary has not been sampled but at low flow would probably be a sodium-sulfate type with concentrations of dissolved solids about 2,500 milligrams per liter (mg/l) or more depending on the volume of flow. During high flow from storm runoff, the dissolved solids content would be 200 to 600 mg/l, probably dominated by calcium and bicarbonate ions. The water is suitable for stock and wildlife supply and provides tributary inflow to the Yellowstone and ultimately the Missouri Rivers.

Groundwater

The principal aquifers in the tract are the near-surface Tongue River and underlying lower Fort Union, and the more deeply-buried Fox Hills-lower Hell Creek. The major groundwater flow in the near-surface aquifers is to the southeast, toward the Yellowstone River.

A small amount of groundwater in the western part of the tract follows surface flow northwestward to the Redwater River. Flow in the Fox Hills-lower Hell Creek aquifer is to the northeast.

Wells inventoried in and near the tract tap only the Tongue River aquifer and perhaps local deposits of terrace gravels. Water levels range from 32 to 79 feet below land surface in the inventoried wells, which are 45 to 115 feet in depth. Yields range from 3 to 20 gallons per minute (gpm). The dissolved solids content of the water ranges from 2,000 to 3,000 mg/l, dominated by calcium, magnesium, and sulfate ions. Five



Figure 1. Looking northward near the western edge of the tract, an area of breaks parallels the tract boundary.

TABLE 1
BLOOMFIELD
SOIL EROSION

SOIL MAPPING UNIT NAME	DEPTH 1/			PERCENT SLOPE	SOIL EROSION POTENTIAL 1/		SURFACE ACRES	PERCENT OF AREA	SOIL 2/ RECONSRT. POTENTIAL	SOIL 2/ HAZARD CONDITIONS	SUITABILITY OF SOIL MATERIAL FOR GROWTH (ACRE FEET) 3/		
	MODERATELY		DEEP 36"		WIND	WATER					GOOD	FAIR	POOR
	SHALLOW 0-20"	DEEP 20-36"											
Badlands	X			--	*Mod	High	143	1	Unsuitable	Erosion, slope	--	--	--
Beaverton complex			X	4-15	Low	High	572	5	Poor	Too sandy, droughty	--	1	4
Cherry silty clayloam, Farnuf loam			X	0-4	Low	Low	1060	9	Fair	Excess lime, too clayey	528	4773	--
Cherry-Lambert complex, Lambert gravelly loam			X	4-40	Low	High	226	2	Fair	Excess lime	--	1130	--
Cherry, Havreton and Trembles Soils, occasionally flooded			X	--	Mod	High	194	2	Fair	Excess lime	--	970	--
Dast-Blanchard complex		X(.60)	X(.40)	2-8	High	High	88	1	Fair	Excess lime, too sandy	5	307	--
Farnuf loam, Cherry silty clay loam			X	4-8	Low	Mod	576	5	Fair	Excess lime, too clayey	223	2657	--
Farnuf-Shambo loams, Shambo loam			X	0-4	Low	Low	1487	12	Fair	Excess lime	1418	6017	--
Farnuf-Shambo loams, Lambert Silt loam, Shambo loam, Shambo-Lambert complex			X	2-8	Low	Mod	3965	31	Fair	Excess lime	3333	16492	--
Lambert silt loam, Shambo-Lambert complex			X	8-15	Low	High	1701	14	Fair	Excess lime	665	7760	45
Lambert-Badland complex	X(.40)		X(.60)	20-80+	Mod	High	285	3	Poor	Excess lime, slope	--	804	31
Lambert-Dim yaw complex			X	15-65	Low	High	748	6	Poor	Excess lime, too clayey	--	2147	1429
Lambert-Ringling complex	X(.40)		X(.60)	15-65	Low	High	275	2	Fair	Excess lime	11	869	44
Lihen loamy sand			X	4-20	High	Mod.	36	<1	Fair	Too sandy	--	180	--
Saline Sand			X	---	Low	Low	24	<1	Unsuitable*	Excess salts	--	---	120
Tally fine sandy loam			X	0-4	High	Mod.	81	1	Fair	Droughty	203	203	---
Tc Tally fine sandy loam			X	4-15	High	High	410	3	Fair	Droughty	1025	1025	---
Tinsley-Lambert complex			X	15-65	High	Mod.	777	1	Poor	Excess lime, droughty	8	1624	2253
Tinsley soils			X	15-65	High	Mod.	18	<1	Poor	Too sandy, droughty	--	6	84
Turner loam			X	2-4	Low	Mod.	104	1	Poor	Excess lime, too sandy	43	200	278
Turner-Beaverton loams			X	0-2	Low	Low	91	1	Poor	Too sandy, droughty	29	175	251
Turner-Beaverton loams			X	2-4	Low	Mod.	31	<1	Poor	Too sandy, droughty	10	86	67
TOTALS							12892	100			7501	47426	4606

Soil Depths	Soil Erosion Potential		Soil Reconstruction Potential		Suitability of Soil Material for Plant Growth
Shallow - 3%	Wind	Water	Good - 0%		Good - 12%
Mod. Deep - 1%	Low - 78%	Low - 22%	Fair - 82%		Fair - 73%
Deep - 96%	Mod. - 5%	Mod. - 39%	Poor - 17%		Poor - 7%
	High - 6%	High - 39%	Unsuitable - 1%		Unsuitable - 8%

*1% too variable to rate

1/ Soil Depth Classification and Soil Erosion Potential is derived from
Dawson County Soil Survey

2/ Soil Reconstruction Potential is derived from the National Soils Handbook.

* Too variable to rate.

3/ Depth (in acrefeet) of available soil calculated from acres x acrefeet/acre =
suitability of soil material for plant growth.

stock and four domestic wells have been inventoried within the tract and five wells have been inventoried outside but within one mile of the boundaries. The water is used for stock and for domestic supply.

LAND USE

Vegetation and Agricultural Production

Agricultural operations in this area consist of: (1) livestock and (2) small grains and livestock. (See Table 2 for land use breakdown on the tract.) Most of the farming in this area is dryland (Figure 2) with small areas being irrigated. A crop-fallow system is used in the dryland farmed area with mainly wheat or barley being grown. Small acreages are used for other small grains, forage crops, potatoes, flax, or pasture.

There are currently 21 agricultural operators who have some or all of their operation within the tract. Two agricultural operators have no cropland within the tract (see Table 3). About 25 percent of the total cropland of these 23 operators lies within the tract. This ownership pattern varies greatly by operator. For example: the largest operator has 5,588 total acres with about 18.5 percent of his operation included in the tract while the smallest operator has 320 acres which are entirely within the tract.

Since about 30 percent of the tract is native vegetation, livestock production is an important part of the agricultural operation. Livestock provide income to farmers by utilizing straw, grain and other crops that are not marketed at the grain elevators. Livestock also graze harvested fields and hay lands on the tract during the off-season. During crop-growing periods, the livestock are moved to native rangeland pastures either on the tract or off, depending on the operator's situation.

Approximately 748 AUMs of native forage for livestock are produced annually on the tract. Assuming that the hay produced on the tract (see Table 2) were fed to livestock, an additional 1068 AUMs would be available to upgrade the winter diet of straw, old hay and winter grazing. Winter grazing on the croplands varies tremendously depending on the amounts of moisture (fall rains, winter snowfall) and the degree of chill factor. A warm wet fall followed by a mild snow-free winter may produce as many as 927 AUMs of fall-winter grazing on the tract. Normally only about 300 AUMs are available on the tract for winter grazing, because of the difficulties in providing water for livestock in the winter.

The vegetation on the tract is typically grassland in aspect, lying between the Prairie County Grassland type and the Northeastern grassland type (Payne 1973). Within these two types are the following subtypes: grassland (2617 acres), badlands (720 acres), sagebrush (412 acres), upland hardwoods (46 acres) and riparian shrub (40 acres), totaling 3835 acres of the tract. Much of the native vegetation lies on the west edge of the tract, in the Redwater River watershed. The riparian shrub and some grassland stream channels are located on the northeast portion of the tract, which is mainly in the Yellowstone River drainage. Islands of shelterbelt trees and tame pastures are found in the cropland areas.

The rough topography of the badland areas (720 acres) are interspersed with sagebrush, grassy ridges, or woody draws. These vegetative types are important to mule deer and other wildlife.

The impacts of intensive livestock use and large deer populations have deteriorated the range condition. It is estimated that about half the range is in poor to fair condition, with the remainder in good condition (Dawson County Conservation District, 1975).

TABLE 2¹
Agricultural Land Use

Land Use	Tract Acres	Average Production Per Acre	Total Annual Production
Cropland	4,409	28.4 bushels	125,216 bushels
Hayland	267	1 ton	267 tons
Range	3,835	0.195 AUMs	748 AUMs
Other ²	311	55 bushels	12,430 bushels
Fallow	4,070	0	0
Total	12,892		

¹Data collected from Dawson County Agriculture Stabilization and Conservation Committee, Glendive, Montana, 1981.

²226 acres, oats; 32 acres, roads etc.; and 53 acres, homesteads.

TABLE 3

BLOOMFIELD

FARM/RANCH OPERATIONS 1/

OPERATOR	INSIDE COAL TRACT (ACRES)							OUTSIDE COAL TRACTS (ACRES)							PERCENTAGE OF THE OPERATION WITHIN THE TRACT
	SMALL GRAIN CROP	HAY	GRAZING	SUMMER FALLOW	OTHER	TOTAL	PERCENTAGE OF TOTAL ACRES LEASED	SMALL GRAIN	HAY	GRAZING	SUMMER FALLOW	OTHER	TOTAL	GRAND TOTAL	
1	361	0	152	361	86*	960	50	0	0	0	0	0	0	960	100.0
2	398	35	207	378	18*	1,036	100	1,647	236	1,109	1,555	5	4,552	5,588	18.54
3	43	85	2	30	0	160	0	511	0	144	443	0	1,098	1,258	12.72
4	122	57	32	105	4*	320	100	1,161	191	899	921	18	3,190	3,510	9.12
5	657	0	275	655	8*	1,595	50.16	0	0	0	0	0	0	1,595	100.0
6	95	0	51	95	79	320	100	843	46	451	837	206	2,383	2,703	11.84
7	132	0	72	116	0	320	0	766	3	438	669	0	1,876	2,196	14.57
8	103	29	47	98	0	277	100	1,216	198	303	1,091	146	2,954	3,231	8.57
9	219	2	48	211	0	480	100	429	77	519	395	0	1,420	1,900	25.26
10	115	0	92	113	0	320	100	0	0	0	0	0	0	320	100.0
11	103	0	755	103	17	978	33.64	680	185	1,150	527	90	2,632	3,610	27.09
12	0	0	206	0	0	206	0	598	230	1,262	598	47	2,735	2,941	7.0
13	730	57	214	647	9*	1,657	0	485	38	78	428	0	1,029	2,686	61.69
14	17	0	80	17	6	120	0	947	100	812	937	91	2,887	3,007	3.99
15	611	0	665	572	32*	1,880	48.94	1,304	7	474	1,190	0	2,975	4,855	38.72
16	93	0	5	62	0	160	0	314	0	103	266	0	683	843	18.98
17	212	0	53	212	3	480	0	352	10	404	350	0	1,116	1,596	30.08
18	274	0	173	183	10	640	0	0	0	0	0	0	0	640	100.0
19	73	0	21	61	0	155	0	1,070	2	1,011	886	0	2,969	3,124	4.96
20	51	2	45	51	7	156	0	430	95	317	368	41	1,251	1,407	11.09
21	0	0	640	0	0	640	0	0	0	111	0	0	111	751	85.22
22 Roads, Res., etc.	0	0	0	0	32	32									
23															
24															
25															
TOTAL	4,409	267	3,835	4,070	311	12,892		12,753	1,418	9,585	11,461	644	35,861	48,753	

¹Data collected from Dawson County Agriculture Stabilization and Conservation Committee, Glendive, Montana, 1981.

²226 acres oats; 32 acres roads, etc., and 53 acres homesteads.

*Has farmsteads within Tract.

Agricultural Economics

This section will be forthcoming under separate cover.

Residential Homes

Approximately nine residential homes and 20 outbuildings are located within the tract (see Figure 2 and Map 3.) These homes are served by existing underground telephone cables and overhead electrical transmission lines.

Transportation and Access

Good transportation access is available within and near the tract. State Highway 200 serves nearby Richey and a spur of the Burlington Northern railroad ends at Richey, Montana. State Highway 254 is adjacent to the east boundary from State Highway 200 south through Bloomfield and ending at State Highway 16 near Glendive, Montana. Several seasonal roads and all-weather county roads traverse through the unit.

Existing Rights-of-Way (Corridors)

A 10-inch high-pressure gas pipeline belonging to Montana-Dakota Utilities crosses the center of the tract in a northwest-southeast direction (see Map 3). A 230 KV transmission line is located approximately 17 miles to the southwest and another one is located 22 miles to the southeast. In addition, a 115 KV transmission line exists approximately 23 miles to the southeast.

The proposed route of the Northern Tier pipeline is located approximately 22 miles to the north.

Recreation

The tract is relatively isolated and devoid of recreational developments. There is legal access through the area, but private landowners control all the surface property. Recreation on this tract is known only in terms of hunting potential. No wilderness values are present.

Hunting District 732, which includes this tract, is important to the deer harvest in Region 7. In 1979, it had the second highest white-tailed deer harvest of any district in the region (Montana FW&P, 1980). A total of 547 white-tailed deer were harvested from Hunting District 732 in 1979. That was over 14 percent of the whitetail harvest from the 29 districts in the region.

There are no public access fishing ponds managed by state or federal agencies on the tract.

WILDLIFE AND FISHERIES

A basic wildlife inventory encompassing this tract is in progress. Until this study is completed (field work Oct.

81, final report Dec. 81), all the significant wildlife values of the tract cannot be assessed. The occurrence of and use by threatened and endangered species, furbearers, song birds and upland game cannot be determined until the wildlife inventory is complete.

The 3,522 acres in the tract, within Hunting District 732, is prime white-tailed deer winter habitat. A whitetail density of 22.3 deer per square mile was determined, when deer were feeding on haystacks, in the winter survey of 1976-77 (Montana FW&P, 1980). The important habitat is located south of the tract boundary.

Essential mule deer winter habitat occurs on the extreme western portion of the tract (Map 3). This habitat is a deep cut canyon and contains the only patches of hardwoods on the tract. The importance of the area to mule deer is due to both the vegetation and the topography. There are approximately 2,486 acres of the canyon within the tract boundary which also forms a corridor leading to 122 square miles of continuous habitat. Deer densities of 4.8/sq. mi. during the winter have been observed.

There is about one-half mile of highly valuable riparian habitat on the north fork of Thirteen Mile Creek. Surface and mineral ownership of this area is private but essential to all wildlife in the area. The remainder of tract contains only marginal wildlife habitat.

There are no fish species of special concern on the tract (Elser et al. 1981). There are no fisheries on the tract, however, the area does drain into Thirteen Mile Creek which does support marginal spring fisheries during wet years.

CULTURAL RESOURCES

The Bloomfield tract has not been systematically inventoried to date. Information from existing inventories (Davis, 1976, BLM unpublished data; Gieser, 1980) outside the tract, but within the Fort Union region suggests that the predominant prehistoric sites should be lithic scatters of varying size, density, and function (ca. 70-80%). Other expected prehistoric sites include stone circles (ca. 10%), ceramic-bearing sites, rock shelters and bison kills (ca. 10% combined).

Expected historic resources include homestead and ranching remains (ca. 50%), historic graffiti and rock art (ca. 20%), freight roads, dugouts, stone cairns, trading posts, burials and battle sites (ca. 30% combined). Further information on cultural resource occurrence, distribution and significance cannot be quantified prior to inventory. BLM sponsored contract inventory in the Fort Union Coal region is scheduled for the summer of 1981, to generate information sufficient to identify and predict the nature, occurrence and significance of cultural resources in the tract in the regional EIS. Subsequent to inventory and prior to the regional EIS, BLM

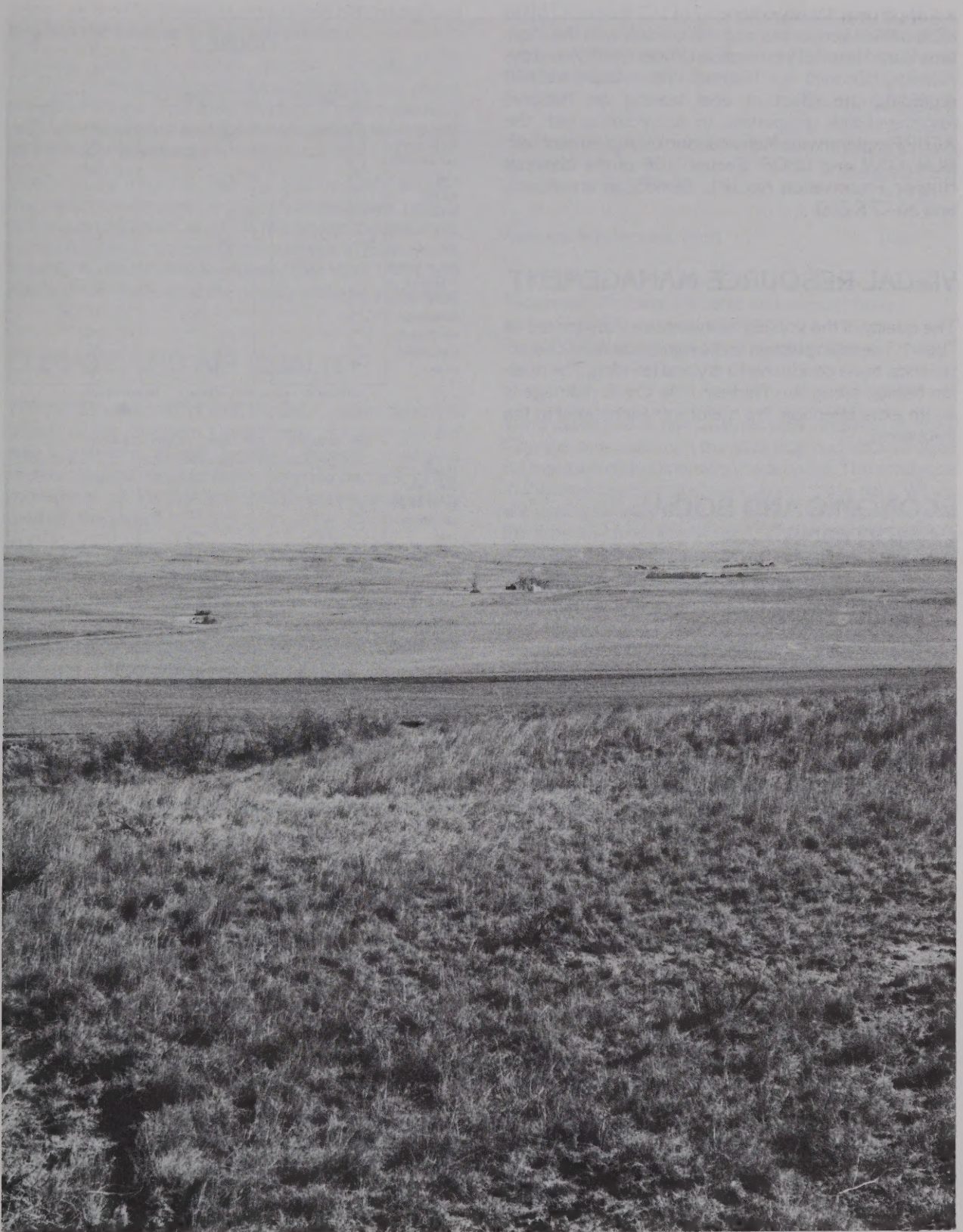


Figure 2. A number of dwellings and outbuildings can be seen in this view in the tract.

will apply unsuitability criterion 7 (43 CFR 3461.1 [g]) to all identified properties and will consult with the Montana State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation (ACHP) regarding the effect of coal leasing on National Register-eligible properties, in accordance with the ACHP Programmatic Memorandum of Agreement with BLM, OSM and USGS, Section 106 of the National Historic Preservation Act (P.L. 89-665, as amended), and 36 CFR 800.

VISUAL RESOURCE MANAGEMENT

The quality of the scenery of this area is categorized as "Low". The rolling terrain lacks significant relief characteristics, but is conducive to dryland farming. The riparian habitat along the Thirteen Mile Creek drainage is worth extra attention. No major intrusions exist in the tract area.

ECONOMIC AND SOCIAL CONDITIONS

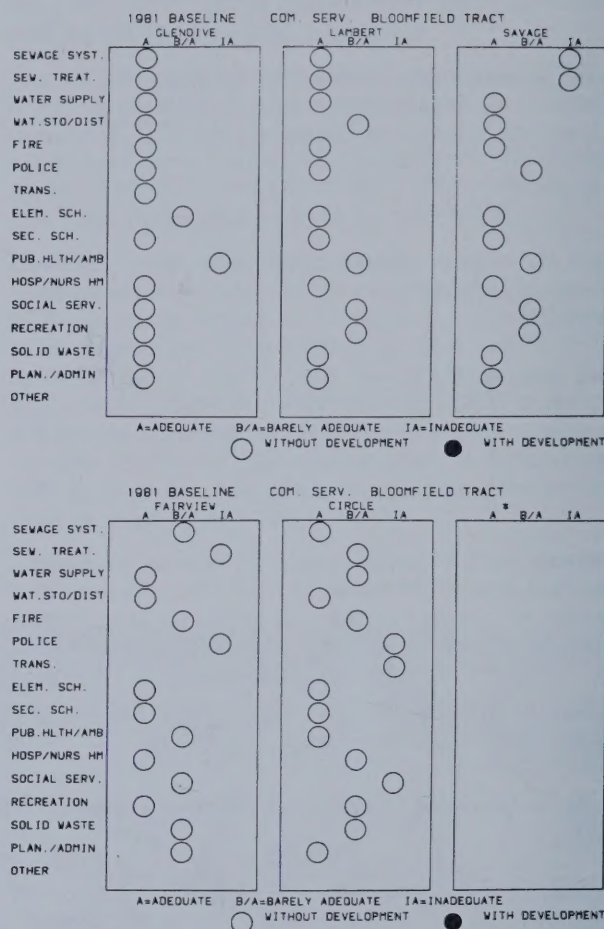
Existing and forecasted population and employment levels for the communities of Savage, Lambert, Fairview, Glendive, and Circle, Montana are shown in Figure 5 (in Chapter III). As this figure shows, future population levels in these communities without energy development (refer to dashed line) are expected to either decline somewhat or remain relatively stable from 1981 through 2000.

These communities are small agriculturally oriented towns which do not have the capability to accommodate any significant population growth without some strain on public services. As Figure 3 shows, all of the above communities are presently (1981) experiencing some problems in providing an adequate or barely adequate level of one or more types of public services. For example, Savage and Fairview are currently experiencing inadequate sewage treatment facilities for their present population.

Persons interviewed in Dawson and Richland Counties identified the lack of shopping opportunities, inadequate medical care, and the shortage of recreation opportunities (including entertainment) as the major existing service needs of the area. In Richland County, road maintenance was also mentioned.

A high proportion (roughly 80%) of Dawson County residents favored local mining development, either directly or with qualifications. Reasons for this support were national energy and economic needs, active resource use, and the need for local jobs. The major concerns of these people (thirty-six persons interviewed) were reclamation, local social disruptions, air quality, and the need to protect agricultural land.

FIGURE 3



SOURCE: Respective city/county or regional planners.

A slightly smaller proportion of residents favored development in Richland County. National energy needs and local economic growth were given as the major reasons for supporting development. While a great majority of people (twenty-two) interviewed supported mining, there was concern expressed on reclamation, air quality, the tax situation, the relationship between landowners and mining companies, and the potential scale and location of development.

Community leaders who were contacted in Dawson County also strongly supported development. Reclamation, taxes and revenues, and water (surface and sub-surface) are the major concerns of these individuals. These reasons are the same as those mentioned by people in the general population.

The pattern was very similar among community leaders in Richland County. National energy needs and the viability of reclamation were given as the reasons for supporting additional mining. The concerns of these leaders include housing, reclamation, allowance of

adequate time for planning, acquisition of funding, and provision of services to the community.

Dawson County residents typically described the friendly, small town social atmosphere as the major benefit of living in their area. The lack of retail opportunities, entertainment, and the harsh climate were listed as the major drawbacks.

Similarly, the informal, friendly, and mutually supportive social environment was given as the major benefit of living in Richland County. While several people mentioned the large number of newcomers in Sidney as a drawback, others interviewed said that retail, traffic and roads, and climate were the major problems in the area.

CLIMATE AND AIR QUALITY

The semiarid climate of east central Montana, which is typical of the Northern Great Plains, results from the area's extreme inland location. Rapidly changing meteorological conditions are common because of the movement of Pacific and Arctic pressure systems through the region.

The climate station utilized for meteorological data for the proposed lease tract is at Miles City (Table 4).

The annual mean temperature in the area is 46°F. The highest monthly mean temperature is 75°F (in July), and the lowest monthly mean temperature is 15°F (in January). The growing season averages 158 days at Miles City.

Precipitation in the area is quite light. Most of it is in the form of rain in late spring and early summer. Annual rainfall totals about 14.2 inches, and snowfall about 32 inches.

TABLE 4
Meteorological Data for Selected Sites*

	Miles City
Temperature, °F	
Mean Annual	46
Mean Monthly Minimum (Jan.)	15
Mean Monthly Maximum (July)	75
Growing season for Grass (temperature 32°F), days	158
Precipitation, in.	
Annual Average Rainfall	14.2
Monthly Range Rainfall	0.5-3.1
Annual Snowfall	32.2
Average No. of mo/yr with Snowfall	10
Annual Stability (by class), % occurrence	
Class A, B, C	15.8
Class D	54.3
Class E, F, G	29.9

Wind Direction

SE-S, 27%
W-NNW, 35%

Windspeed, mph (% of time)

0-3.5 (8.4)
3.6-6.9 (23.3)
7.0-11.5 (39.6)
11.6-18.4 (21.3)
18.5-24.2 (5.5)
> 24.3 (1.8)

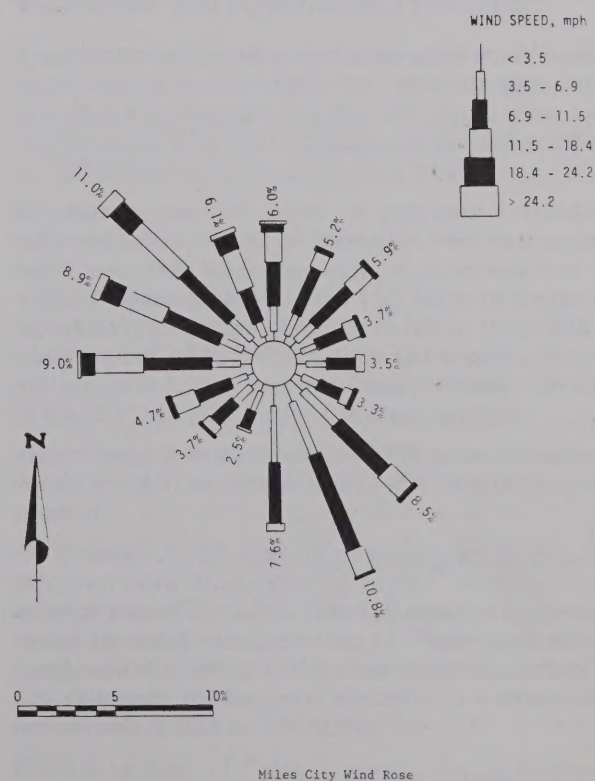
Average Windspeed, mph

10.6

*Sources: National Oceanic and Atmospheric Administration, 1980
Powder River Site Specific Analysis, 1981

Wind data used in this analysis were obtained at Miles City, the only station in the area that had data suitable for input into the dispersion model used. The wind rose in Figure 4 represents a summary of these data. Winds are predominantly from the W to NNW 35 percent of the time and from the SE to S, 27 percent. Windspeed averages 10.6 mph annually and exceeds 11.5 mph 28.6 percent of the time.

FIGURE 4



SITE SPECIFIC ANALYSIS

Although the terrain offers little obstruction to the dispersion of pollutants the area experiences prolonged periods of depressed mixing heights and low wind speeds, which tend to concentrate pollutants.

According to total suspended particulates (TSP) monitoring data, annual geometric means in this area is 25.9 ug/m^3 and the arithmetic mean is 42.5 ug/m^3 . The

sparse population in the area precludes consideration of the sampler as an urban impacted site. The background level for this analysis was determined to be 42.5 ug/m^3 .

No Class I area falls within the impact range of the proposed tract. Visibility in the area ranges from 45 to 70 miles.

CHAPTER III

ENVIRONMENTAL CONSEQUENCES

TOPOGRAPHY

Mining and reclamation would result in a pattern of less contrasting topography. Original drainage patterns would be reestablished, returning the site to its general premining appearance.

GEOLOGY

Production through the life of mine is estimated at 420.6 million tons of lignite. During this time, the tract would be temporarily committed to a single use that would in turn impact other uses.

The lignite removed by mining (420.6 million tons) and that portion left by current recoverable techniques (an additional 46.7 million tons) would be lost from future use.

SOILS AND RECLAMATION POTENTIAL

The proposed action would have a significant short term impact on the soil in the tract (see Table 1). By the end of mine life, 12,892 acres would be disturbed.

Soil impacts include: displacement of soil from wind and water erosion, change in soil structure and natural fertility, and soil compaction from haul roads. Significant problems in revegetation and stabilization on steep slopes would occur.

In the tract, 78 percent of the soil has a low potential for wind erosion and 39 percent of the soil has a moderate potential for water erosion (see Table 1). Proper seeding of stockpiled soil would reduce this erosion rate.

Disturbances of the soil would result in alterations of soil structure and porosity. This alteration would affect permeability, infiltration rates, soil-air and soil-water relationships and bulk density. The natural fertility would be affected by disruption of the nutrient cycle and a decrease in organic matter content within the soil. Salinity content would increase as a result of the lower calcareous horizons being brought to the surface.

The soil profile reconstruction potential is determined by the soil hazard condition. The tract is rated 82 percent fair, 17 percent poor and 1 percent unsuitable for reconstruction. Suitability of the soil material for plant growth is rated as 12 percent good, 73 percent fair, 7 percent poor and 8 percent unsuitable (see Table 1). The soils rated poor would require more intensive and costly management to be revegetated and stabilized. In the long-term the impacts to the soil would not be significant.

HYDROLOGY

Seepage into the mine pits would provide some of the industrial water supply for the mine. Nine known existing wells would be destroyed and five known nearby stock or domestic supply wells could be impacted by lowered water levels during mining or by a degraded chemical quality following mining. The potable water supply for the mine can easily be provided by wells tapping the Fox Hills-lower Hell Creek aquifer. An additional public water supply of about 400 AF/hr would be needed because of the increase in population. No significant adverse impact is anticipated, owing to additional development of the public supplies.

Some degradation of water quality would occur following reclamation in the replaced spoils and in the adjacent Tongue River aquifer southeast of the mining unit. The severity and aerial extent of the impact depends on the rate of groundwater flow and the amount of increase in dissolved solids in ground water that passes through the replaced spoils. The water would probably be suitable for livestock and wildlife but would not be potable. This represents a long term adverse impact.

LAND USES

Vegetation and Agricultural Production

The leasing and development alternative would have a significant short-term impact on individual agriculture operations in the tract. By the end of the mine life, 12,892 acres of the tract would be disturbed, in addition to 160 surface acres used for mine facilities.

An average of 155 acres of cropland, excluding summer fallow, would be removed from production each year. This would be an average annual loss of 4,402 bushels of wheat. This 155 acres of cropland would be out of production ten to fifteen years with a maximum of 1,530 to 2,318 acres out of production in any one peak mining year, resulting in a maximum loss of 43,452 to 67,620 bushels of wheat annually.

Peak mining year disturbance of 267 acres of hayland would result in an annual loss of 267 tons of hay production.

An average of 129 acres of rangeland would also be removed from production each year, resulting in an average loss of 25 AUMs. This 129 acres of rangeland would be out of production ten to fifteen years with a maximum of 1,266 to 1,918 acres out of production in any one peak mining year, resulting in a maximum annual loss of 247 to 374 AUMs.

Further analysis of Table 3 reveals that agricultural production of the tract averages from 15.8 to 28.6

percent of the combined total production of all 21 grain and livestock operators. The lowest percentage is for hay production, which affects only a few of the operators who raise hay. One operator raises all his hay on the tract, while another has 60 percent of his hay land on the tract.

There are four grain and livestock operations totally inside the tract. One operator leases all of his operation, while two others lease half of their operations. The fourth operation is owner-operated. The impact on these operations of removal for mining for ten years is such that they would probably cease operations.

There are ten leased operations inside the tract. Six of the operators involved have no other lands inside the tract, including the operator previously mentioned. The other lessees depend upon the tract for approximately 9 to 25 percent of their operations. Four other operators lease half or less of their operations, but would probably have to cease operation or find off-farm employment during the mining operation.

Regionally, these losses would not pose significant reductions in area agricultural production. Analysis of economic impacts both to individual operations and regionally will be forthcoming under separate cover.

Among the chief areas of concern in the tract are the upland hardwoods (46 acres) and riparian shrub (40 acres) areas. These areas are vital to many wildlife species, especially mule deer, and it is doubtful that these areas can be restored after mining and subsequent reclamation.

The Montana Department of State Lands will set the standards for establishing a diverse, effective, permanent vegetation cover on all rangeland areas, with coordination and cooperation from the office of Surface Mining and the Bureau of Land Management.

Agricultural Economics

This section will be forthcoming under separate cover.

Residential Homes

Approximately 9 residential homes and 20 outbuildings would have to be relocated or a 300-foot buffer zone maintained, which may be waived by agreement of owners of the occupied buildings.

Transportation and Access

Access is available to the mine facility via a county road, however it would have to be upgraded to accommodate heavy traffic.

Approximately 29 miles of private and county roads within the tract would eventually have to be relocated as mining progresses. In addition, approximately 10.5 miles of out-of-pit haul road would be required. The

haul road is outside the tract and would have to be acquired from private land owners.

The major impact on the present transportation system due to mining the Bloomfield tract would be an increase in volume on existing transportation modes. This would result in increased accident rates, system deterioration, rising maintenance costs and decreased efficiency if not mitigated.

Existing Rights-of-way and Needs

Approximately 4.8 miles of an existing 10-inch high pressure gas pipeline right-of-way passes through the center of the tract and would have to be relocated or a 100-foot buffer zone maintained. Approximately 23 miles of right-of-way for electrical transmission lines would be needed to service the mine facility. Existing buried telephone cables are within the tract. There could be a need for a nine-mile railroad right-of-way from Richey to the mine facility.

Recreation

The recreation potential of this tract over a long period of time might actually improve with lease activity as any developed water may be convertible to wildlife uses. However, the significant impacts during mining would be felt off-site. The influx of mine workers would cause additional pressure on existing recreation facilities or uses such as hunting and fishing within the region. The exact concentration or location of this activity is not predictable at this time.

WILDLIFE AND FISHERIES

Mining the agricultural lands would reduce the available winter forage in a localized area, causing a redistribution of the wintering white-tailed deer to other farmlands south of the tract. Upward of 50 whitetails were found feeding on haystacks during the winter inventory of 1976-77 (Martin, 1981). Damage to crops and livestock could result if the whitetail concentrate south of the tract. This could be significant to individual operators.

Mining would remove approximately 3,386 acres of important mule deer winter habitat if the area is not declared unsuitable for mining (Map 3). This area forms a narrow band leading to 122 square miles of essential winter range. Mining in these areas would cut off about 2 square miles in the northern part of this range forcing deer onto flat, less secure habitat, making them more vulnerable to hunting and poaching pressures.

Destruction of the habitat would cause a reduction in the numbers of animals in the herd which cannot be quantified. However, it would be enough to reduce hunting opportunities in the area. This would be a

long-term irreversible impact. If the area is declared unsuitable for surface mining, there would be short-term impacts to mule deer. The disturbance from mining would probably make portions of the winter range unavailable. After mining and reclamation, the habitat would still be available and the mule deer could return.

Poaching and road kills have increased dramatically in areas of Montana, Wyoming and Colorado where energy development has occurred. The problem is compounded in areas where shift changes of workers coincide with feeding periods, especially big game (Streeter, et al., 1979).

Actions to mitigate these impacts available to entities other than BLM would be to provide mass transportation of workers and adjusting the times of shift changes which would greatly reduce poaching. This has been used successfully in other mining areas (Streeter, et al., 1979). Providing funds for the Montana Department of Fish, Wildlife, and Parks for increased law enforcement or adoption of a poaching clause in union contracts would also help.

Proposed haul road locations running through both the white-tail and mule deer winter concentration areas would result in major road kills of deer as well as the further destruction of essential mule deer winter habitat. About one-half mile of prime riparian habitat would be destroyed by mining. This would impact all of the wildlife in the area. Antelope are of little significance on the tract.

CULTURAL RESOURCES

Until a systematic inventory of cultural resources in the tract is completed, no definitive assessment of impacts can be made. All cultural resources within the tract would be subject to direct impact from construction of mine, haul roads, water development, and mining activity. Cultural resources not immediately impacted by the above activities are subject to impacts from increased erosion, access and vandalism. Direct impact would result in damage and destruction to cultural resources, artifacts, their immediate environmental context and the information these contain. Subsurface cultural resources not previously located by surface inventory would also be destroyed.

Should the tract be leased, a mitigation program would be undertaken for all affected cultural resources. Development of avoidance and preservation alternatives is preferred; these would minimize impact to cultural resources. If these alternatives are not feasible, a scientific program of data retrieval will be developed and implemented for all cultural resources within the tract.

VISUAL RESOURCE MANAGEMENT

The greatest impact on esthetic qualities, for the duration of mining, would be the marked change from a rural to an industrial setting. Mining operations would be visible from the main road (FAS 254). Mine facilities and spoils piles would be visible. Dust arising from mine operations would probably be one of the most obvious visual impacts.

Following the period of mining, the mine site and the visual signs of mining, would be largely, if not entirely, camouflaged by reclaimed vegetation.

NET ENERGY ANALYSIS

A net energy analysis was calculated using the guidance contained in BLM Washington Office Information Memo 80-640, July 17, 1980. Approximately 37.7 British thermal units (Btus) would be expended to produce a pound of coal. That pound of coal would, in turn, produce about 6,698 Btus. The ratio of energy expended to that energy produced is 1 Btu/178 Btus.

ECONOMICS AND SOCIAL CONDITIONS

Construction and operation of the Bloomfield tract would result in significant impacts upon services in some communities within the areas a result of population growth associated with employment opportunities. Figure 5 shows forecasted community employment and population levels through 2000 both with and without development of the Bloomfield tract. As these figures show, Savage, Lambert, Fairview, Glendive and Circle, Montana would experience a significant increase in both population and employment as the result of the development of the tract.

Changes in regional personal income from tract development are expected to be insignificant through the year 2000. The communities in which the workers and their families reside would experience some increases in economic activity as a result of employment payroll expenditure and through company expenditures for goods and services during the construction and operation phases. The Bloomfield tract is forecasted to boost regional personal income by a maximum of 0.6 percent over baseline values by 1991 and beyond as a result of expenditures associated with the operations phase of this tract.

Peak employment during the construction phase of the Bloomfield tract is expected to occur in 1986 at 265 employees with full operations employment expected

FIGURE 5

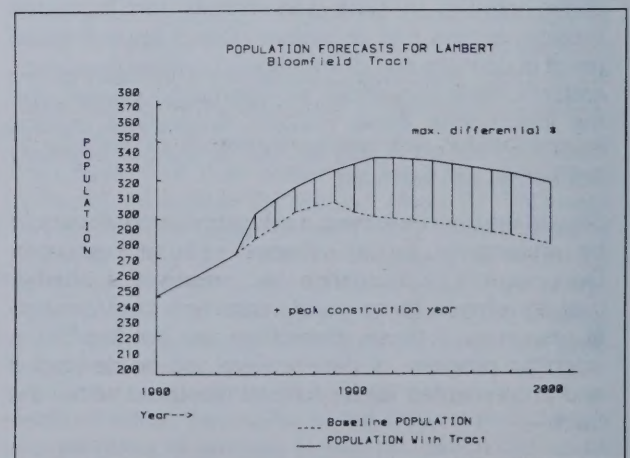
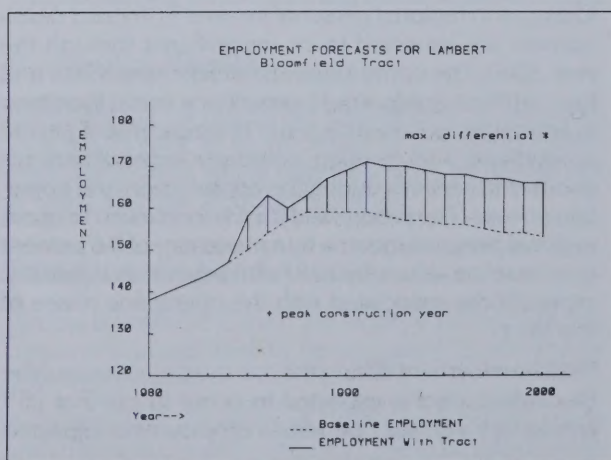
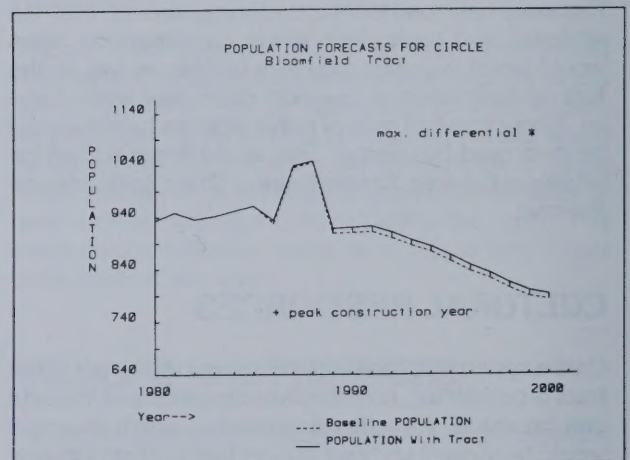
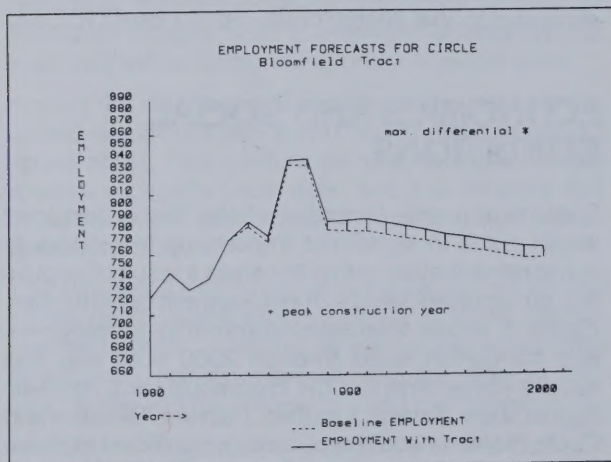
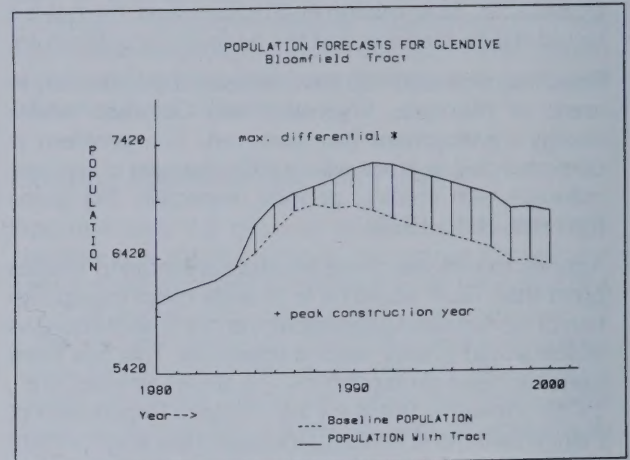
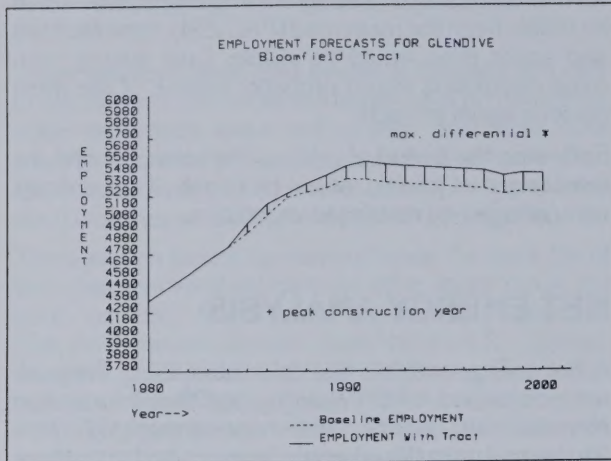
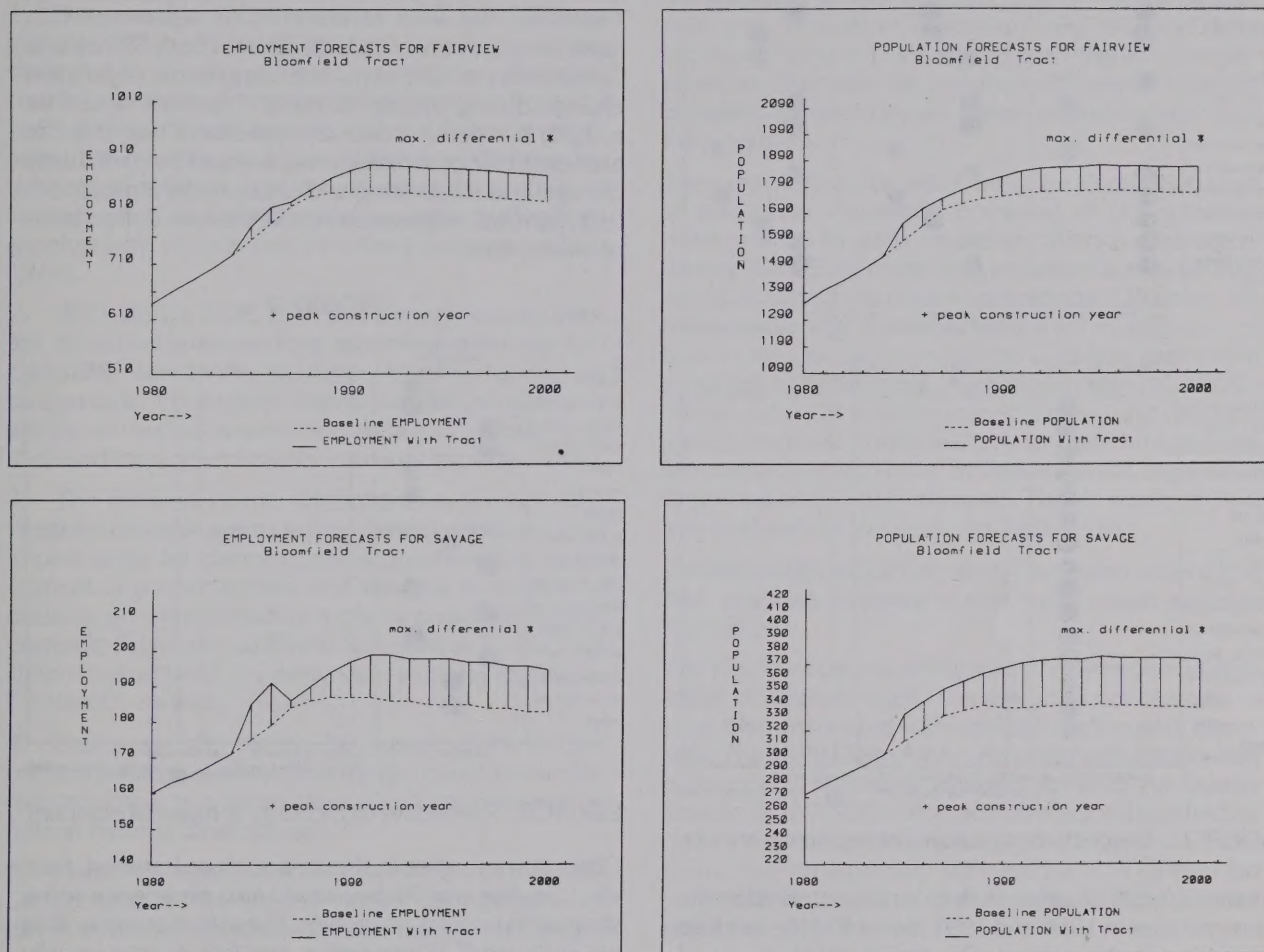


FIGURE 5 (continued)



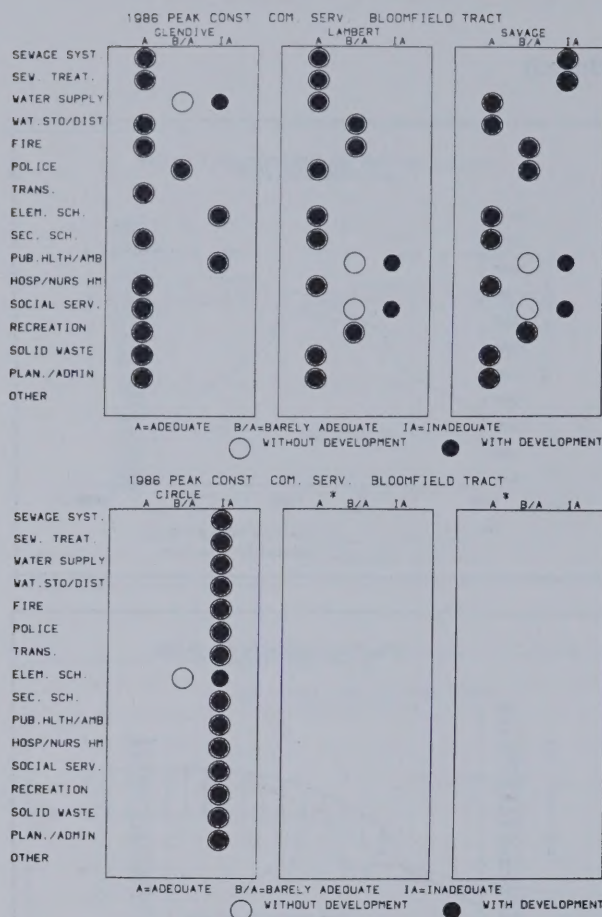
SOURCE: Mountain West Research, Inc., 1981.

in 1991 at 450 employees. Using 1986 as the first primary impact date, it is estimated that the communities of Savage, Lambert, Glendive and Circle would experience an inadequate level of one or more community services as a direct result of the 1986 peak construction employment/population levels (Figure 6). Glendive, for example, is forecasted to face an inadequate water supply situation as a result of population growth attributable to the construction of the Bloomfield tract. Additionally, Fairview, West Glendive, Richey and Sidney would experience an inadequate level of some community services by 1986 without tract development. A tract-related population influx in these communities would further exacerbate an inadequate service situation, however, the inadequacy of these services would not be directly tied to tract development.

Full operation of the Bloomfield tract (i.e., 1991 and beyond) is also expected to result in minor impacts on community services. Figure 7 shows that Fairview would experience inadequate fire protection as a direct result of the population influx resulting from tract operation. However, the following communities in the study area are forecasted to face inadequate public services by 1991 even without development of the tract: Lambert, Glendive, West Glendive, Richey, Sidney, and Circle. Development of the tract would worsen an inadequate service structure.

The adequacy ratings appearing in Figures 6 and 7 reflect assessments by either city-county or regional planners for the communities involved and constitute the planners best judgments concerning the fiscal

FIGURE 6



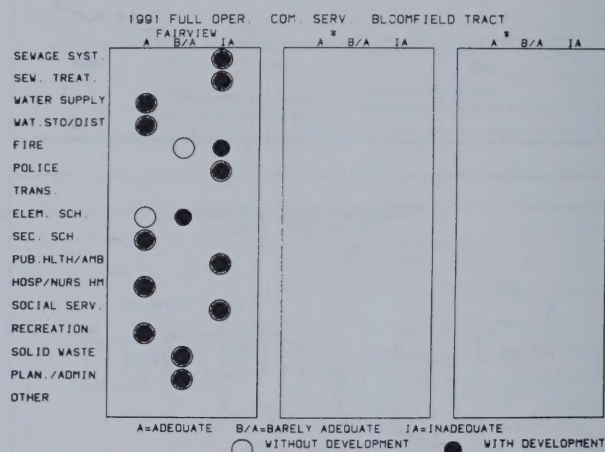
SOURCE: Respective city/county or regional planners.

(revenue/cost) situation likely to be encountered by the communities in 1986 and 1991. Several of the services appearing in the community service graphics are of greater importance than others in maintaining public health and safety. Basic services such as sewage collection and treatment, water supply and water storage/distribution, health care and police/fire protection are of more immediate concern to community well-being than are nonbasic services such as recreation facilities and libraries. Consequently, communities which experience impacts to these basic services would undergo somewhat greater difficulties than would a community which experiences impacts on its nonbasic services. Additionally, inadequacy of basic services (water and sewage systems especially) can be difficult for a community to deal with because of the relatively large capital expenditures required for upgrading these types of services.

Dawson and Richland counties are very similar in several ways. Both are relatively economically diverse with stable or, in the case of Sidney (Richland County), growing populations. A clear majority of respondents in both areas favored development.

Sidney in Richland County and Glendive-West Glendive in Dawson County, are sufficiently large to accommodate additional population from the Bloomfield tract. In addition, Sidney has had considerable recent experience with rapid growth due to oil and gas activity. Therefore, the level of community experience with rapid development is considerable. In both Sidney and Glendive-West Glendive, the long-term population change during the operation of this mine would be roughly 5-7 percent over the baseline. Thus, it is not expected that coal development would be particularly disruptive to the existing and future social atmosphere (e.g., political, religious structure, lifestyle, and patterns of interaction).

FIGURE 7



SOURCE: Respective city/county or regional planners.

Other communities in the area such as Lambert, Fairview, Savage, and Richey would also experience some short-term population growth. These four communities are quite small in population, and less diverse socially and economically than Sidney and Glendive-West Glendive.

It appears that development of the Bloomfield tract would, considering the existing population base and recent exposure to other forms of energy development, be minimal in terms of long-term social effects.

The majority of respondents in both Richland and Dawson counties stated that the small town, friendly atmosphere was the element they appreciated most about their communities. This factor would be disrupted to some extent by energy development because of the necessary population change. However, for most long-term respondents such changes would not be of such a scale to seriously detract from the benefits of residing in these areas.

On the negative side, the lack of retail and entertainment facilities could be reduced if future population growth would attract additional businesses. At the same time, population growth could effect the other negative factors mentioned by residents.

Mitigation of social and economic impacts can be accomplished through several technical and/or financial categories from both federal and state sources. These include:

1. Mountain Plains Federal Regional Council Energy Impact Office. This office has several functions designed to alleviate impacts on counties and communities, including: (a) provide information about and facilitate applications for technical and financial assistance, (b) develop and participate in workshops for state, local, federal, and industry people on impact assessment and mitigation, (c) encourage and facilitate development of local energy impact assessment task forces.
2. HUD, USGS, DOE, EPA and Department of Labor are all active in sponsoring advanced planning and mitigation assistance. However, because of federal budget cuts, it is unclear whether any federal agencies will be committed to providing technical assistance to state and local governments in energy impacted areas.
3. The Farmers Home Administration (FmHA) 601 Program provides grants to designated (approved) coal impact areas for planning, site acquisition, and development of public facilities and services in addition to housing on sites owned by a city or county. However, currently there are no Montana counties in the Fort Union Region which are designated as being eligible for FmHA 601 monies.
4. States currently receive 50 percent of the federal mineral leasing royalties. This money could be used to mitigate impacts in those areas which are impacted by federal mineral development.
5. Montana Department of Commerce (formerly the Department of Community Affairs (DCA)) provides direct technical assistance to communities in the coal resource areas of eastern Montana. This assistance includes workshops and training sessions in local planning and impact assessment, growth management and impact mitigation techniques, funding sources for planning and public facilities and others.
6. The eastern Montana field office of the Department of Social and Rehabilitative Services is available to assist eastern Montana communities assess and plan for human service impacts.
7. Funding by the Montana Coal Board is available to local governments which have been required to expand the provision of public services as a consequence of large scale development of coal mines and coal-using energy complexes. These funds originate from an 8.75 percent portion of the revenues from Montana's coal severance tax.

Technical reports are available which discuss the methodology used in the economic or social analyses.

CLIMATE AND AIR QUALITY

Impacts on climate from the proposed action would be localized and insignificant. The modification of surface contours and surface reflection due to redistribution of soils and removal of vegetation may produce slight localized changes in windspeed and direction, temperature, and humidity. Reclamation with reestablishment of vegetation would largely mitigate these impacts over the long term.

The methodology for determining the air quality impact of particulate emissions consisted of (1) obtaining mine profiles for each tract from the U.S. Geological Survey (USGS), (2) obtaining emission factors for individual surface coal mining operations, (3) using the mine profile and emission factors for calculations of total emissions, (4) entering the emission data into a modified climatological dispersion model (CDMQC) for prediction of ambient concentrations, and (5) comparing predicted concentrations to National and State air quality standards and to Prevention of Significant Deterioration (PSD) increments. The air quality impact was analyzed for the peak production year.

Details about the CDMQC model, emission factors, and their application appear in a technical report available from BLM.

The results of the modeling exercise were plotted on a series of isopleth maps. The predicted concentrations were then compared with applicable air quality standards. The 1970 Clean Air Act Amendments established primary and secondary National Ambient Air Quality Standards (NAAQS). Montana also has established air quality standards. These standards are shown in Table 5. The Montana primary standard for total suspended particulate is the same as the corresponding Federal standard.

All pollutant sources must be evaluated to determine if Prevention of Significant Deterioration (PSD) regulations apply. These standards are also shown in Table 5.

During the peak coal production mining period, total particulate emissions from the proposed action are predicted to be 3021.41 tons per year, with best available control technology applied.

Dispersion modeling was performed to predict particulate concentrations for comparison with the National Ambient Air Quality Standards and State of Montana standards. Areas within the active mining area, such as the mine facilities, pit areas, and reclamation areas, are not subject to these standards.

The isopleth lines on Figure 8 indicates annual geometric mean particulate concentrations that will result from implementation of the proposed action. During peak coal production, the highest annual geometric mean concentration at a location off the mine site

TABLE 5
Ambient Air Quality Standards

Pollutant	Averaging Time	Federal Primary Standards		Montana State Standards	
		ug/m ³	ppm	ug/m ³	ppm
Sulfur Dioxide	Annual (Arithmetic)	80	0.03	60	0.02
	24-hour	365	0.14	260	0.10
	3-hour			650	0.25
Total Suspended Particulate	Annual (Geometric)	75		75	
	24-hour	260		200	
Carbon Monoxide	8-hour	10,000	9		
	1-hour	40,000	35		
Photochemical Oxidant	1-hour	240	0.12		
Nitrogen Dioxide	Annual	100	0.05		
Lead	3-month	1.5			

Prevention of Significant Deterioration (PSD) Regulations

Class II area	ug/m ³
Sulfur Dioxide	
Annual Arithmetic mean	20
24-hour maximum	91
3-hour maximum	512
Particulate matter	
Annual Geometric mean	19
24-hour maximum	37

Source: National Ambient Air Quality Standards 1970; Montana State Department of Health and Environmental Sciences.

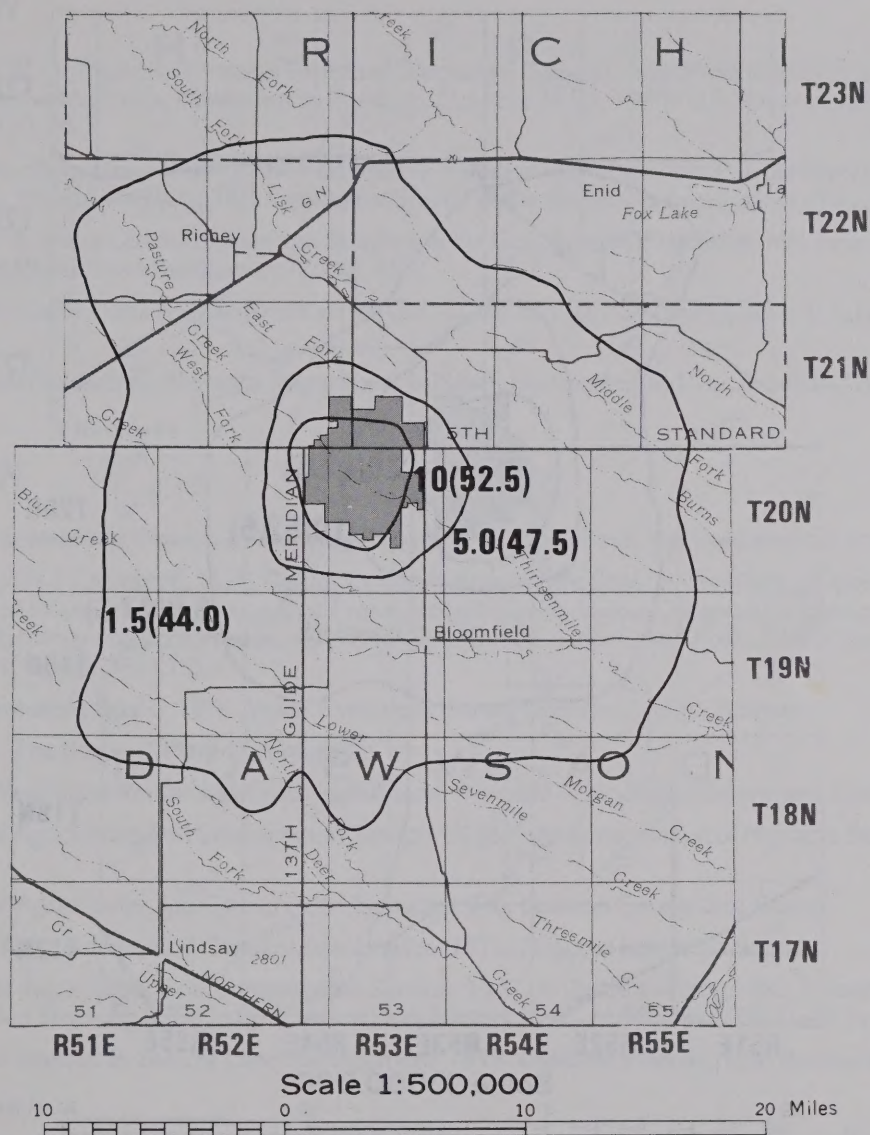
would be 11.3 ug/m³. With a background concentration of 42.5 ug/m³, the highest annual geometric mean ambient concentration would be 53.8 ug/m³. This value is less than the Montana particulate standard of 75 ug/m³.

Montana's 24-hour standard of 200 ug/m³ cannot be exceeded more than once a year off the mine site. Figure 9 shows predicted 24-hour maximum particulate concentrations that would result from the proposed action. The isopleths represent a composite of 24-hour levels; therefore, the values occur over the year period indicated rather than simultaneously. 24-hour maximum values with the proposed action during full coal production would be as high as 32.2 ug/m³. With the background concentration added, ambient levels would be 74.7 ug/m³. These levels are within the Montana 24-hour standards.

In addition to the annual and maximum particulate standard, Montana has a PSD incremental standard of 19 ug/m³ annually and 37 ug/m³ for a 24-hour maximum which cannot be exceeded more than one time per year. The proposed mining activity will not violate these standards.

Several small sources of gaseous pollutants (sulfur dioxide, ozone, and nitrogen dioxide) are associated with surface coal mining operations. These include haul trucks, front-end loaders, scrapers, and dozers. Sources also include light-duty vehicles (chiefly pickup trucks) operated in the mine and employee vehicles operated on mine access roads.

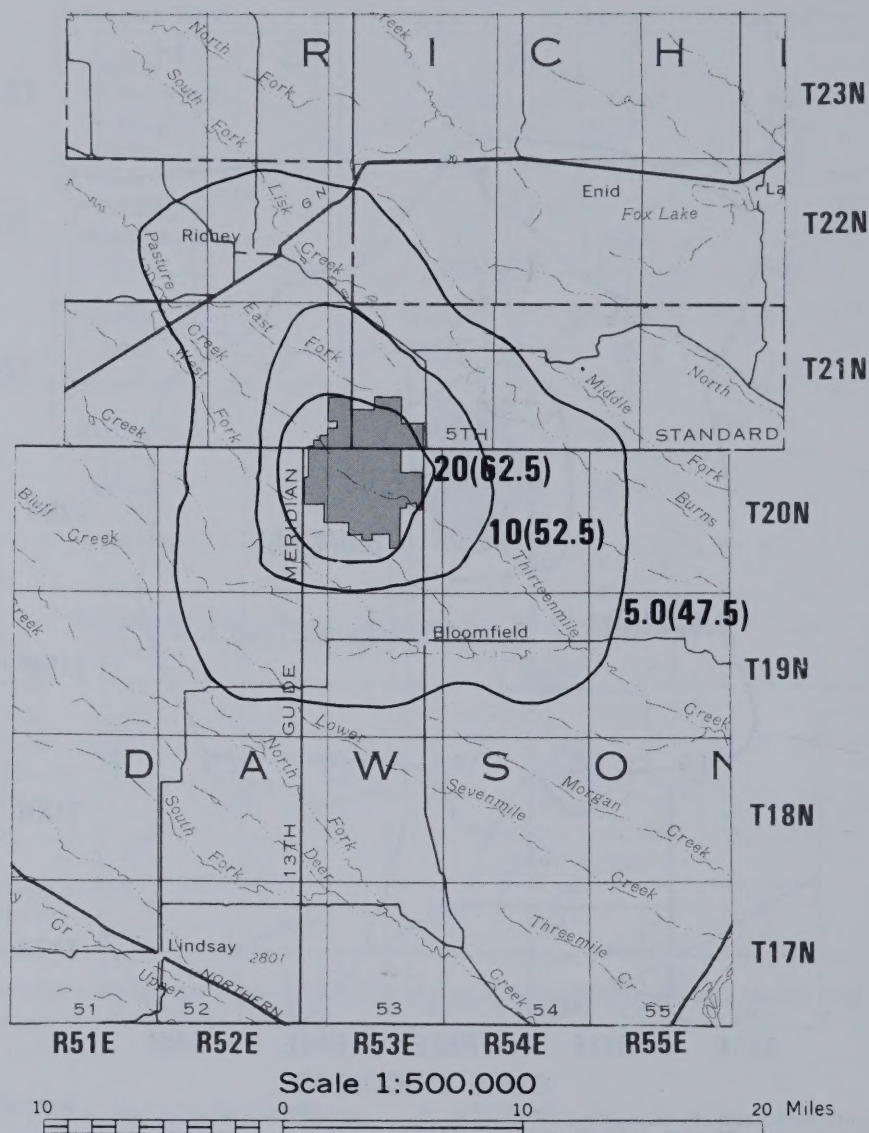
Review of the Site-Specific Analysis Reports for the Powder River tracts that have similar tons per year of coal production to the Fort Union tracts indicates that gaseous emissions are not expected to violate any air quality standards.



Bloomfield Tract

TSP Annual Average Concentration ($\mu\text{g}/\text{m}^3$) Isopleths

Note: Number in parenthesis indicates predicted concentration plus background concentration.



Bloomfield Tract

TSP Maximum 24-hour Concentration ($\mu\text{g}/\text{m}^3$) Isopleths

Note: Number in parenthesis indicates predicted concentration plus background concentration.

FIGURE 9

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SUMMARY MATRIX BLOOMFIELD TRACT Resource and Environmental Considerations

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECTS OF LEASING	SIGNIFICANCE OF ANTICIPATED IMPACTS	DATA RELIABILITY	COMMENTS
Topography	Varies from breaks, badlands to rolling cropland.	Less contrasting topography, but original drainage pattern would be reestablished.	Very Low	Good	
Geology and Minerals	Tract is underlain by formations that are prospectively valuable for oil and gas. There are no known wells on the tract.	None	None	Acceptable	
	Tract contains 420.6 million tons of coal.	Loss of 46.7 million tons of coal for future use by current recoverable techniques.	Low	Good	
Soils and Reclamation Potential	There are 33 soil series in the tract mapped at level two in a survey done by Soil Conservation Service which are found along sedimentary plains and high terraces on uplands.	There will be displacement of soil by water and wind erosional forces; change in soil structure and natural fertility and problems in revegetation and stabilization on steep slopes.	Significance of the impact will be high. Reconstruction potential is rated as 82 percent fair and suitability of soil material for reclaimability is rated as 73 percent fair and 8 percent unsuitable	Data reliability is 40 percent from the Dawson County Soil Survey for rangeland and 60 percent reliable for the bottomlands.	The better soils in the bottomlands were more accurately mapped than those on the rangelands and steep-sided slopes.
Hydrology Surface Water Quantity	Thirteen Mile Creek and an unnamed tributary have only intermittent flow in response to thunderstorms and snowmelt. Estimated annual yield is 370 ac. ft.	Only very slight reduction of flow during mining. Possible slight effect after mining.	Low	Good	
Quality	Probably a sodium-sulfate type of water with dissolved solids concentration about 2500 mg/l. During high flow, the dissolved solids content would be 200-600 mg/l probably dominated by calcium and bicarbonate ions. Water could be used for stock and wildlife supply.	None		Fair	Flow in Thirteen Mile Creek and tributary has not been sampled. Dissolved solids content is only an estimate.
Alluvial Valley Floor and Flood Plains	No alluvial valley floors are known to occur in the Bloomfield tract.			Good	

SITE SPECIFIC ANALYSIS

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECTS OF LEASING	SIGNIFICANCE OF ANTICIPATED IMPACTS	DATA RELIABILITY	COMMENTS
Ground Water Use in Tract	5 stock and 4 domestic wells in use in the tract and 5 nearby stock or domestic supply wells within 1 mile of tract boundaries.	All wells in the tract would be destroyed.	Minimal cost for mining company to redrill well. The domestic wells could be destroyed if mining is deep enough to disturb Tongue River Aquifer.	Good	Wells located by use of USGS & MT State inventories. Numbers may vary with what actually exists.
Quantity	Natural groundwater flow in near-surface aquifers is to the southeast, toward the Yellowstone River. Flow in deeper aquifer is to the northeast	Flow into mine pits probably would provide industrial water supply for mine. 5 wells outside tract could be affected during mining by lowered water levels. Additional public water supply of about 400 AF/HR needed due to increased population	Low.	Good	Not known if the 1 existing well in tract is stock or domestic. If domestic, it may have to be drilled deeper to obtain comparable water.
Quality	Dissolved solids content of well water in and near tract ranges from 2000 to 3000 mg/l, dominated by calcium, magnesium, and sulfate ions.	Some degradation of Tongue River aquifer at and to south-east of tract could follow reclamation and replacement of spoils.	Severity of impact depends on rate of groundwater flow and increase in dissolved solids in groundwater that passes through replaced soils.	Fair-Good	
Vegetation Rangeland Type	Subtypes	Acres	Acres Being Disturbed		
Prairie	Grassland	2617	Grassland	2617	
County	Sagebrush	412	Sagebrush	412	
Grassland	Badlands	720	Badlands	720	
Northeastern (MT) Grassland.	Upland Hardwoods	46	Upland Hardwoods	46	
	Riparian Shrub	40	Riparian Shrub	40	
	Total	3835	Total	3835	
					Many native plant species may be lost through mining. Impact may be minimized by immediately respreading topsoil.
					Moderate to high
Animal-Unit-Months (Dawson County Average)	748 AUMs annually	Average annual loss of 25 AUMs. Each acre would be out of production from 10 to 15 years. Maximum loss in any one peak mining year would be 1266 to 1918 acres and 247 to 374 AUMs.	depending upon individual operation. Low to moderate for overall tract production.	Grazing data from Dawson County Conservation District Long Range Program developed in 1975.	
			Low		
Threatened or Endangered Plant Species	There are no reports of threatened or endangered plant species on the tract.	Low		Good	No plants in MT. have been accepted as yet by the FWS for inclusion on the Threatened or Endangered Plants List.
Noxious Weed Species	There are four noxious weeds found growing in the Redwater MFP area. Canada Thistle is the only noxious weed found on the tract. species are: A. Canada Thistle B. Leafy Spurge C. Cocklebur D. Field Bindweed	Low to Moderate	Low to Moderate	Data obtained from the Richland Glendive Planning Unit documents, developed in 1978.	Variation of impact depends on whether the mining operation disturbs noxious weeds before seed has been produced or afterward and how the topsoil containing noxious plant roots is handled.

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECTS OF LEASING	SIGNIFICANCE OF ANTICIPATED IMPACTS	DATA RELIABILITY	COMMENTS
Cultural/ Historical Values	Tract not inventoried to date. BLM sponsored inventory scheduled for 1981. Expected prehistoric resources include lithic scatters (70-80%), stone circles, (10-20%), ceramic bearing sites, rockshelters, kill-sites (10% combined). Expected historic resources include homestead and ranch remains (50%), historic rock art (20%) freightroads, dugouts, cairns, trading posts, burials and battle sites (30% combined).	Direct impact to all cultural resources in the tract through damage, destruction, and increased erosion, access and vandalism.	Damage and destruction to sites, artifacts, their immediate environmental context and the data these contain. Low if required mitigation is followed.	Good to excellent.	Expected resources in tract have been extrapolated from the literature on reported sites in the Fort Union KRCAs and inventory surrounding the Fort Union Region (BLM unpub., David, 1976; Greiser, 1980; Johnson, 1977; Reeves, 1970).
Recreation	No development or known uses on tract. Road access, but no public access to surface land.	Positive: (1) access to surface property, (2) possible ORV zone, (3) aquatic potential, (4) reduction-hunting opportunities Negative: extra pressure on existing rec. facilities within region-due to added population.	Short-term - moderate Long-term - low	Poor	Recreation data (research) does not exist for this area.
Wilderness	No Wilderness in tract	None	None	N/A	N/A
VRM	Class "C" Scenery rating. Rolling terrain, which supports dryland farming. Pleasant habitat mix along Thirteen Mile Creek and drainage. No adverse intrusions within tract.	Loss of natural landscape characteristics; air pollution; powerline intrusions; facility development; Lowering of scenery quality to minimal rating.	Short-term - high Long-term - low	Moderate	Loss of visual qualities is to be expected with extractive activities
Net Energy Analysis	6,698 Btus/lb.	The ratio of energy expended to that energy produced is 1 Btu to 178 Btus.	None	Acceptable	
Climate and Air Quality	Excellent	Minimal background addition. All applicable standards will be met.	Insignificant	Fair	

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SITE SPECIFIC ANALYSIS

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECTS OF LEASING	SIGNIFICANCE OF ANTICIPATED IMPACTS	DATA RELIABILITY	COMMENTS
Agriculture	There are 8,972 acres of land in the tract that are currently being cropped. The irrigated lands are found adjacent to the bottomlands.	Average annual loss of 155 acres, excluding 4,070 total acres of summer fallow. Annual production on this 155 acres would be 4,402 bu. of wheat. Maximum loss in any one peak mining year would be 1,530 to 2,318 acres and 43,452 to 67,620 bu. of wheat.	Moderate to high depending upon individual operations. Low to Moderate for over all tract production.	Data reliability is 95% from the Dawson County Agriculture Stabilization and Conservation Committee. Reliability of data determined by cross-checking data received.	
Land Use	No industrial activity. Farming is primary use. Little or no ranching. Nine residential homes.	Introduction of industrial activities. Land required for mines, roads, railroads, and powerline rights-of-way. Land required for housing.	Moderate during mining. Low to none after reclamation.	Good	Existence of power lines, rail lines, and industry may encourage further development of area.
Wildlife Mule Deer	See Range Section for acreages. Steep sided canyon with only hardwoods and security cover.	If not declared unsuitable, 2,486 acres of essential habitat destroyed and migration corridor cut off. Short-term impacts from disturbance if declared unsuitable.	Significant irreversible impacts to essential mule deer winter range. Reduction in hunting opportunities from habitat destruction and population reduction from poaching.	Good	Reclamation of steep slopes and shrub habitat unsure.
Threatened & Endangered Species	None known to occur. Not accessible until baseline study complete (Dec.1981)	Insignificant with present data.	Insignificant.	Good, not complete	
All other wildlife and fisheries.	Marginal habitat not an important wildlife area except canyon mentioned above and 1/2 mile of riparian.	Insignificant	Insignificant	Good, not complete	About 1/2 mile of riparian habitat on private surface and mineral will be destroyed. If drainage is re-created, reclamation is possible.
White-tailed Deer	Up to 22.5 white-tailed deer/sq.mi. feeding on haystacks in winter on tract.	Possible increased crop degradations from white-tailed deer on areas off of tract.	Could be significant to individual operators	Good	
General					Increased poaching could significantly reduce all wildlife populations in the region if not controlled. It could reduce recreation opportunities.

Economics and Social Conditions

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECTS OF LEASING	SIGNIFICANCE OF ANTICIPATED IMPACTS	DATA RELIABILITY	COMMENTS
Population/ Employment	Population and employment levels are forecasted to be relatively stable through the year 2000.	Communities of Glendive, Lambert, Savage, Circle and Fairview would experience population and employment increases.	Population increases in these five communities are of low to moderate significance.	Good	See population and employment graphics in Chapter 3 for more detail.
Regional Personal Income	Regional personal income forecasted to increase moderately through the year 2000.	Slight increase in regional personal income from tract construction and operation.	Insignificant	Fair	
Infra- structures	(Baseline/forecast) Most services are currently adequate or barely adequate in Glendive, Lambert, Savage, Circle and Fairview.	These five communities would have one or more services which would become inadequate as a direct result of tract development.	Glendive and Fairview would experience moderate to high impacts as a result of water supply and fire protection (respectively) becoming inadequate from tract related population growth. Low to moderate significance in remaining communities.	Excellent	See community service graphics in Chapter 3 for greater detail.
Resident's Perception of Community Services	(Baseline/forecast) Problem areas: Richland Co.: a) roads, traffic b) medical c) recreation/ entertainment Dawson Co.: a) medical b) recreation/ entertainment	N/A	N/A	Good-both counties	
Social Attitudes	Majority of respondents favored coal development (conditionally).	N/A	N/A	Good-both counties	
Quality of Life	Most residents cited the small town friendly atmosphere as the most salient aspect of quality of life.	Some slight deterioration in overall quality of life.	Insignificant	Good	

BLOOMFIELD TRACT UNSUITABILITY CRITERIA RESULTS

Criterion	Applicable to Tract	Exception Used (if applicable)	Additional Data Needed	Comments
1. Federal land systems	Applied	N/A	N/A	No federal land systems found within the tract.
2. Rights-of-way and easements	Applied	None	None	Applied to Federal surface and/or private surface over federal coal.
3. Buffer Zones	Pending	N/A	Yes	Requires agreements w/local governments and private owners of dwellings.
4. Wilderness study areas	Applied	N/A	N/A	No wilderness study areas found within tract.
5. Scenic areas	Applied	N/A	N/A	No scenic areas found within tract.
6. Land used for scientific studies	Applied	N/A	N/A	No lands used for scientific study were found within the tract.
7. Cultural and historical sites	Pending further study	N/A	Yes	Applied upon completion of inventories (Dec., '81)
8. Natural areas	Applied	None	None	No designated natural areas within the tract.
9. Federally listed endangered species	Pending further study	N/A	Yes	To be applied in Dec. '81.
10. State listed endangered species	Pending further study	N/A	Yes	To be applied in Dec. '81.
11. Eagle nests	Pending further study	N/A	Yes	To be applied in Dec. '81.
12. Eagle roosts and concentration areas	Pending further study	N/A	Yes	To be applied in Dec. '81
13. Falcon cliff-nesting sites	Pending further study	N/A	Yes	To be applied in Dec. '81
14. Migratory birds	Pending further study	N/A	Yes	To be applied in Dec. '81

SITE SPECIFIC ANALYSIS

Criterion	Applicable to Tract	Exception Used (if applicable)	Additional Data Needed	Comments
15. State resident fish and wildlife	Pending further study	N/A	Yes	To be applied in Dec. '81
16. Flood plains	Applied	None	None	No significant flood plains were found within the tract.
17. Municipal watersheds	Applied	None	None	No municipal watersheds were found within the tract.
18. National resource waters	Applied	None	None	No national resource waters were found within the tract.
19. Alluvial valley floors	Applied	N/A	None	No drainages within the tract qualify as AUFs.
20. State proposed criteria	Applied	None	None	No State criteria

PRELIMINARY FACILITY EVALUATION REPORT

PRELIMINARY FACILITY EVALUATION REPORT

GOALS AND OBJECTIVES

The Fort Union Regional Coal Team, in its consideration of leasing federal coal, will address the likely coal end-uses and their implications. The purpose of evaluating how the coal will be used is to present the most probable major impacts of development.

The end-use facility evaluations are at a reconnaissance level and the reports are presented only as general approximations of facility characteristics and impacts.

The uncertainty of actual end-use facilities and the inherent problems in defining a "typical facility" limit end-use analysis to broad generalizations. The evaluations are not meant in any way to substitute for detailed site specific evaluations, EISs, or analyses which come later when mining and facility projects are actually proposed. The end-use facility evaluations will not preclude any federal, state, local, or private decisions concerning actual end uses, facility siting, or end-use restrictions. The end-use reports are meant only to provide additional information to be used in decisions concerning the leasing of federal coal in the Fort Union Region and should not prejudice any later decisions.

End-use evaluations, referred to as preliminary facility evaluation reports, have been prepared for those tracts for which a new coal-use facility is expected to be built. One of the three proposed end-use facilities has been assigned to those tracts based on expressions of interest, tract size, or existing facilities. The typical facilities to be considered are: a 250 million standard cubic feet per day gasification plant; a 1,000 megawatt electric power generation plant; and an 85,000 barrel per day indirect coal liquefaction plant.

Part I of the report summarizes what the assigned typical end-use facility might be like. The description of the facility gives plant size, process technology, plant requirements (fuel, land, water, power), emissions, and other characteristics of facilities likely to be proposed in the Fort Union Region. The description includes ancillary facilities and a discussion of construction and operational aspects of the facility that are relevant to determining impacts that could occur in the vicinity of the tract.

The facility description is based on existing analyses, studies, environmental impact statements, and consultation with State and industry representatives. Part II of the facility report is an analysis of the facility impacts on the tract area.

The preliminary facility evaluation reports will be used by the Regional Coal Team to rank federal coal tracts with a better understanding of likely future development impacts and implications.

PART I

Assumptions and Variables

The typical gasification facility characteristics are based on numerous assumptions and reasonable values for important variables. Some of the assumptions and variables are based on best estimates. Others are based on existing literature, facilities, and on input from industry sources.

Facility Location, Type, and Size

Because of the economics of lignite coal, it was assumed in the early stages of the Fort Union coal leasing process that the end-use facilities would be near the tracts to be leased. The energy value of lignite coal as well as the water content make the transporting of lignite for long distances uneconomical. For purposes of issue level impact analysis, the gasification facility assigned to the Bloomfield tract is not specifically located but assumed to be near the tract. Such an assumption will eliminate the problems of arbitrarily siting facilities. Facilities were sited, however, for the air quality modeling. Where specific site location information was available from potential project developers it was used in the facility analysis.

The typical gasification plant, using the Lurgi gasification process, would produce approximately 250 million cubic feet per day of synthetic gas. Industry proposals indicate the Lurgi process would likely be used for gasification plants built in the Fort Union Coal Region during the next decade. Many of the other assumptions and variables are based on the characteristics of the proposed Great Plains Coal Gasification Project, which will use the Lurgi process.

Construction Period

The construction time span for a synthetic fuel facility can vary greatly. A company hiring four to five thousand construction workers could complete the proposed facility in as short a time span as three years. A company could choose to lengthen the construction period or build parts of the plant capacity in two or more construction phases. This would reduce the construction work force and spread construction over as many as ten years.

The assumption is that the facility will be constructed in phases. The gasification plant will have a two-phased construction period with each phase lasting four years. The construction of one phase would result in partial plant capacity in operation earlier, enabling the company to generate an early return on their investment.

Construction of one phase should provide the company with technical information, enabling them to make modifications in the second phase.

Employment

The construction work force will be a function primarily of the construction schedule. The average yearly employment figures are based on the projected work force for the Great Plains Gasification Plant.

Water Requirements

Water demands for a coal gasification facility depend on production technology, operation time, and water quality. The values used for water requirements are based on estimates from ANG. The value for gallons per minute is an estimate of average water use for the facility. The yearly requirements are an approximation based on an operation factor assumed for the facility. This operation factor indicates the time the facility will be in operation each year.

For analysis purposes, water for the gasification facility is assumed to come from the Yellowstone River.

Emissions

The air emissions for the gasification plant will depend primarily on the facility's production process, the amount and quality of coal burned, the level of pollution control, and whether or not the facility produces its own electric power.

An important assumption is the source of a facility's electric power. It will be assumed that the gasification facility will produce its electric power on the plant site with coal-fired boilers and steam turbines. While the Great Plains Gasification project will, in fact, use electric power from an adjacent electric power plant, such an arrangement is not considered in this analysis to be typical. Rates for air emissions are estimates based on what the Great Plains Gasification Project would emit if it produced its own electric power.

An assumption affecting air emissions from a generic facility is the quality of the coal. The sulfur, ash, and water content of the lignite will not only influence emissions per ton of coal burned, but will also determine the amount of coal required for a given facility. The amount of coal required for a generic gasification facility could vary from 11 to 14 million tons per year depending on the coal quality and certain process characteristics.

The air emissions from any type of coal conversion facility will be a function of the conversion process characteristics and the emission control technology used at the facility and the level of control used. The possible variation is evident when the emission rates for the Great Plains Coal Gasification and Nokota Methanol facilities are compared. The two facilities will produce

approximately equivalent amounts (BTU values) of gas and methanol. The emissions for the two facilities are expected to vary considerably, due to the difference in the level of emission control planned for each facility.

The impacts resulting from air contaminants emitted by the coal end-use facility are deduced by using established air quality standards above which deleterious effects of the contaminants are implied to occur. A facility's ability to meet air quality standards assumes there would be no significant deleterious effects to human health, animals or vegetation. Such an assumption is the subject of continuing discussion and is disputed by certain research studies. A more detailed discussion of this issue can be found on pages 37-94 in the Final West-Central North Dakota Regional Environmental Impact Study on Energy Development (October 1978). The facilities could also emit certain pollutants for which there are no standards. The anticipated levels of air quality concentrations of contaminants are obtained by measuring existing levels of air quality and adding computer simulation of the atmosphere loading resulting from the end use facility.

The air quality impacts are considered in terms of ambient air standards and prevention of significant deterioration standards. Under authority of the Clean Air Act of 1970, the State of Montana has promulgated its own ambient air quality standards. The purpose of the Montana Ambient Air Quality Standards is to control the quality of the air over Montana such that a) the health of sensitive and susceptible segments of the population will not be adversely affected; b) concentration of pollutants will not cause public nuisance or annoyances; c) significant damage to animals, ornamental plants, forest and agricultural crops will not occur; d) visibility will not be significantly reduced; e) metals or other materials will not be significantly corroded or damaged; f) fabrics will not be soiled, deteriorated, or have their colors affected; and g) natural scenery will not be obscured. Montana's ambient air standards are generally more stringent than the federal EPA standards, and they include a number of criteria for which there are no EPA standards, such as visibility (Class I areas only), hydrogen sulfide, and fluoride.

Under authority of the Clean Air Act Amendments of 1977, Prevention of Significant Deterioration (PSD) standards apply to all areas that are in compliance with federal standards for particulate matter and sulfur dioxide. PSD establishes three air quality classes. Class I areas allow only a small incremental increase in pollution beyond existing conditions in the area at the time of designation. The bulk of the United States was designated Class II, which allows for well-planned growth and some additional pollution, although within limits that are well below the standards. Class III applies to areas of industrial growth and permits incremental increases in pollution up to, but not exceeding, the standards. Since 1974, Congress, the states and Indian tribes have been eligible to petition EPA to classify areas Class I and

Class III, providing that various specified procedures are followed. Wilderness and certain other specially managed areas in existence before August 1977 received automatic Class I designations, and the Northern Cheyenne Tribe requested and received Class I status for its reservation in mid-1977. The federal Clean Air Act states that pollutants originating in Canada are to be included in calculating the existing air quality of neighboring regions of the United States for purposes of enforcing the PSD standards, unless the governor of a state takes action to exclude such pollutants.

After March 1979, the states were to be responsible for administering the PSD regulations and for processing redesignation petitions. However, due to changes in the federal rules, PSD delegation for Montana has not yet been approved. The Air Quality Bureau is presently evaluating procedural alternatives for PSD administration.

An in-depth analysis of air quality impacts resulting from facilities associated with certain coal lease tracts was impossible. Discussion of site specific impacts without addressing the interactive and cumulative impacts would have little decision value. For the purpose of this analysis, the end use facility which has been assigned to the coal lease tract will be discussed. This discussion will contain general statements regarding facility impacts on the air quality. The impact analysis is based on standard dispersion computer modeling using the worse case situation. The analysis is in terms of compliance or noncompliance with ambient air quality standards or PSD standards. A limited analysis of this type cannot be substituted for a detailed permit review. Care must be taken to use this information with the proper qualifiers and should not be taken out of context.

Solid Wastes

Estimates of solid wastes from the facility are based on figures from ANG. Estimates for ash and sludge could vary considerably depending on the ash content of the coal and the pollution control technology used. Planned facilities are proposing to dispose of solid wastes in the nearby mines.

GASIFICATION FACILITY

Introduction

A typical lignite coal gasification plant would use the Lurgi gasification process to produce an average of 250 million standard cubic feet per day of synthetic gas. The gasification complex situated near its coal source would consist of the following major areas: 1) coal preparation, storage, and handling; 2) gasification units; 3) process facilities; 4) pollution control facilities; and 5) ancillary facilities.

The total land area dedicated to the gasification plant site would be about 960 acres. Major structures would include: 1) buildings to house the gasifiers; 2) coal preparation facilities; 3) boiler plant; 4) boiler stack; 5) compression building; 6) other buildings—administration, shops, warehouse; 7) ponds for clarified water storage, process water, and storm water catch basin; and 8) distillation and absorption columns.

Lignite received directly from the nearby mine by truck or conveyor would be crushed, sized, and sent to storage piles. When needed, the coal would then be resized, weighed, and sent by conveyor either to the gasification plant or to the steam generation area.

The supporting process facilities would include steam generation and distribution, power generation and distribution, oxygen production, raw water supply and water treatment, and fire protection. The wastewater treatment system would be designed for maximum reuse within the plant. No wastewater would be discharged to surface waters. Gaseous waste streams would be treated prior to discharge from a 500 foot stack. Waste solids from coal processing, wastewater treatment units, and from the ash handling system would be dewatered and disposed of at the mine. By-products such as sulfur, oil, phenol, ammonia, and tar would be recovered, stored, and either consumed in the plant or sold. A water intake pipeline would draw water from a nearby source. Water would be used in the gasification process, in steam generation, in cooling, and for plant utility and sanitary purposes. There would also be a product gas pipeline to transport the gas away from the facility. Other ancillary facilities would be roads and a railspur.

Employment

The construction of a gasification facility would be completed in two consecutive phases. Phased construction would involve building one half of the plant's capacity in about four years followed by a four-year construction period for the second half. Peak employment for phased construction would be about 3,000 workers late in the third year. Table 1 shows average yearly employment for phased construction. Once the facility is in full operation, it would employ approximately 900 workers.

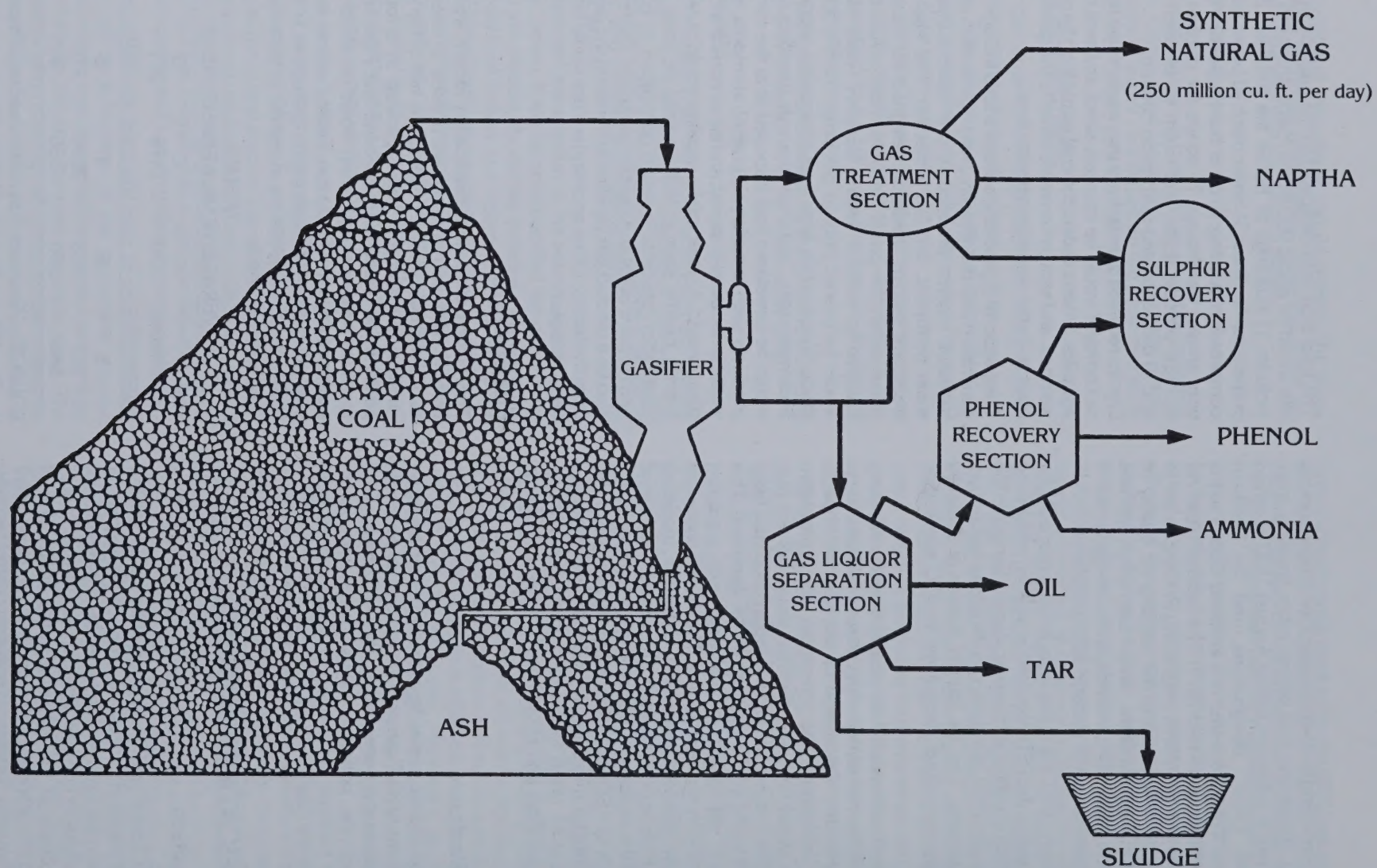
TABLE 1
AVERAGE YEARLY EMPLOYMENT

Year	1	2	3	4
Construction	230	1376	2617	2192
Permanent			440	580
	5	6	7	8
	567	1388	2094	1317
	580	580	580	900
				900

SOURCE: American Natural Resources Company for the Great Plains Coal Gasification Plant.

Figure 1

TYPICAL COAL GASIFICATION PROCESS



Coal Preparation, Storage and Handling

The coal receiving system would include crushing, weighing, and sampling. The coal would then be conveyed to either an active or inactive storage pile. The inactive storage pile would amount to a 30-day supply and would only be used during extended shutdowns in the mine. The live storage pile would feed the plant on a day-to-day basis. The gasification plant would require approximately 13.5 million tons of coal to be mined each year. Coal fines not used in the gasifiers would be used for steam and power generation. See Figure 2.

Gasification Process

In the gas production section, coal, steam and oxygen are reacted under conditions of controlled temperature and pressure to produce a crude gas containing methane, hydrogen, carbon monoxide, carbon dioxide, excess steam and various by-products and impurities. Before leaving the gas production section, the hot crude gas is cooled and scrubbed to partially remove impurities. The ash is sent to disposal. The crude gas from the gas production section is split into two streams. One stream is sent to the shift conversion section. The other stream bypasses the shift conversion section and is sent to the gas cooling section. The shift conversion section adjusts the hydrogen-carbon monoxide ratio in the crude gas stream. The shifted gas is then also sent to the gas cooling section. In addition to lowering the temperature of these two gas streams before they are combined, the gas cooling section also removes more by-products and impurities. The combined gas streams are sent to the gas purification section which removes naphtha and acid gases (carbon dioxide and hydrogen sulfide). The stream is then sent to the methanation section to upgrade the heating value of the gas feed stream from the gas purification section. The upgraded synthesis gas is then passed once more through the gas purification section.

Finally, the clean product gas is sent to the product gas compression section where it is compressed to pipeline pressure.

Process Facilities

The main boiler plant for the gasification facility would generate steam to drive turbines for electric power generation, to drive compressors and large pumps and to supply process steam for coal gasification. A 500-foot stack would disperse flue gases from the steam boilers, the super heater, and other heaters. Steam generated in the high pressure boilers will power extraction condensing turbines driving the three air compressors in the oxygen plant. The steam from the air compressor turbines will be combined with steam generated in the methanation waste heat boilers. This steam will then be supplied to the gasifiers and to the

turbine drivers. Average operating electric power requirements would be approximately 150 megawatts. The oxygen facilities would provide gaseous oxygen to the gasification process.

Raw water would be piped in from a nearby water source. Pump capacity would be installed to meet the normal plant operating requirements of approximately 8,000 gallons per minute. The raw water entering the plant is processed in a clarifier.

Emissions and Pollution Control

The two principal sources of gaseous effluents at the facility—gaseous waste streams from the gasification process and the combustion flue gas streams—will be treated to reduce the concentrations of SO₂ with a scrubbing system and particulates with electrostatic precipitators. Emissions of NO_x can be controlled by means of mixing and flame quenching techniques. See Table 2 for emission rates. Gaseous streams containing hydrocarbons will be incinerated. The steam boiler flue gas will be treated prior to being combined with the other gas streams for discharge via the common stack.

TABLE 2
AIR EMISSIONS (lbs/hr)

Particulate	Sulfur Dioxide	Nitrogen Oxides
575	4600	2800

SOURCE: Estimates based on emission figures from the American Natural Resources Company.

Water will be recovered to the maximum possible extent for reuse. That which is not recovered will either be disposed of with the solid wastes or lost as vapor from cooling processes.

Induced draft cooling towers would handle heat rejection. One tower would use clarified fresh water. Another tower would use gas liquor process water from the Phenosolvan and Gas Liquor Separation units. A third cooling tower, using clarified fresh water, would be required for the oxygen plant to eliminate the hazard of any hydrocarbons entering the oxygen plant system.

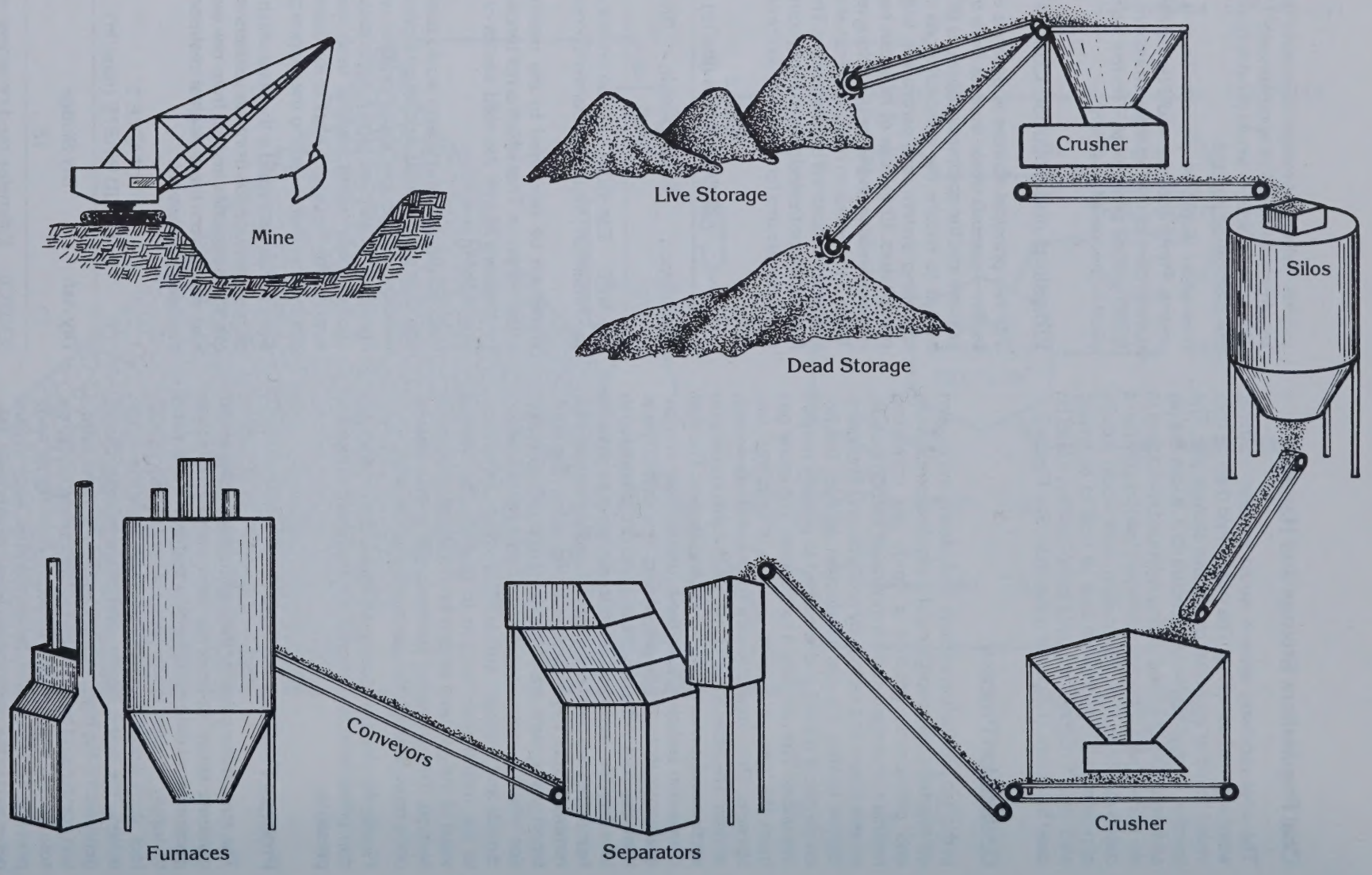
Solid wastes generated at the plant which would require disposal include ash from the gasifiers and steam boilers, inorganic salts and silt from raw water treatment, and sludge from the biological treatment unit and the scrubbing equipment.

TABLE 3
SOLID WASTE (tons/hr)

Dry Ash	Dry Sludge	Water
10	18	28

SOURCE: Estimates based on emission figures from the American Natural Resources Company.

Figure 2
COAL HANDLING SYSTEM



The ash would be dewatered and returned to the mine. The salts and silt as well as the sludge would be disposed with the ash in the mine.

On-site storage facilities for liquid by-products would be provided. Anhydrous ammonia would be stored as a liquid at atmospheric pressure. Tar by-products could be utilized as fuel within the plant or sold. All storage tanks would be located in diked areas capable of holding the entire contents of each storage tank. Liquid elemental sulfur produced in the sulfur recovery plant would be stored in a lined, heated sulfur pit.

Ancillary Facilities

A railspur would connect the facility with an existing rail system. The spur would have a 150-foot right-of-way. Rail loading and unloading facilities would be provided for by-products. The water pipeline will require a right-of-way 100 feet in width for construction and 50 feet wide permanently. The product gas will be piped from the plant to an existing pipeline system and will have similar right-of-way requirements.

PART II

Relationship of Tract and Facility

The Bloomfield tract lies approximately six miles north of Bloomfield and ten miles south of Richey in northern Dawson County, Montana. The tract consists of 12,892 acres of land with recoverable coal reserves of 420.6 million tons.

The likely use of coal mined from the tract would be for a gasification plant. To consider the impacts of this coal use facility, it is assumed that the typical gasification facility described in Part I would be constructed adjacent to or near the tract with no specific site designated, except for purposes of air quality analysis.

Soils, Vegetation and Agriculture

In the Bloomfield tract area, the agricultural land consists of approximately 70 percent cropland, 2 percent hayland and 28 percent rangeland. Based on 1978-1979 county averages determined from ASCS data and from BLM grazing files annual production per acre would average 28.4 bushels per acre of wheat, 1 ton per acre for hayland and .195 AUMs per acre for rangeland.

Assuming the same agricultural land use distribution for the 960 acre disturbance estimated for a generic gasification facility, annual agriculture production foregone on the facility site would be 13,632 bushels of wheat annually, in a worst case situation analysis, for the life of the facility.

A short-term disruption of 12 acres per mile would result during construction of an undetermined length

of water pipeline. Roadways would disturb 14.5 acres per mile. A railroad spur, also of undetermined length until final siting of the facility would eliminate agriculture on 18 acres per mile for the entire life of the facility.

Erosion losses due to wind and water from ground disturbed during the construction phase of the facility, given State permitting stipulations, would not be significant. Regionally, the agricultural production foregone on the 960 acre facility site also would not be significant. Because of the highly-buffered soils in the tract area and downwind, no significant impacts to soils are expected from acid rains.

There is evidence documented in the literature (West-Central North Dakota Regional Environmental Impact Study on Energy Development, 1978) that there are potential negative impacts to vegetation and to livestock downwind from such a facility due to nitrogen oxides, sulfur dioxide and particulate matter. Such negative impacts would be analyzed in detail at such a time as more specific information becomes available in conjunction with facility permit application with the State permitting authority.

Water

Water requirements for a gasification facility are approximately 8,000 gallons per minute or 12,000 acre feet per year. The likely source of water for industrial use is the Yellowstone River. Water requirements of 8,000 gpm are equivalent to approximately 17.9 cfs. Mean discharge of the Yellowstone at Sidney, Montana, for 67 years is 13,140 cfs. Minimum discharge for the period of record is 470 cfs. Withdrawal of water would have no significant impact upon the river. A requirement that the facility have a storage reservoir to supplement needs during low flows would minimize any environmental impacts. Facility wastes of ash, sludge and water disposed of in the mine do have the potential to degrade water quality if they are disposed of within the saturated zone which develops upon reclamation. Present regulations require state approval of disposal sites.

Land Use

Changes in land use include displacement of existing use, increased intensity of existing uses and the introduction of new uses. The site of the facility is likely to displace agricultural use.

The optimum site conditions for facilities are the same as for agriculture, that is: gentle topography and soils with good drainage characteristics. The increase in population of communities results in demand for new housing, additional commercial development and expanded public use facilities. The area of this development will likely be on off-site agricultural land. The on-site displacement of agricultural land use is discussed in the Agriculture section of this report.

Increased population would create a demand for community services as addressed in the Social and Economic Conditions section of this report. This demand implies a need to expand existing facilities and commercial establishments or to create new ones. Existing commercial establishments may suffer through the construction of new facilities outside the downtown areas. Public services would be stretched in the short-term by lack of capital to implement change due to increased population. Parking shortages, traffic congestion and excessive wear and tear on roadways would make downtown areas less habitable. Municipal organizational structures and physical space may prove inadequate with increased population. For example: a part time mayor may be overworked, processing of permits may delay private building construction and filing space for public records may prove inadequate.

With the influx of workers and their families, a change in the composition of the community is inevitable and demands for new forms of public and commercial facilities for shopping, recreation, entertainment would ensue. These types of changes are likely to result in dissatisfaction by both the existing resident population and by the newcomers. Conflicts are likely to occur as a result of the contrast in the lifestyles of these populations.

Existing planning varies considerably from community to community. Some are prepared for change pre-saged by recent oil and gas development in some areas, while others are ill-prepared for the change in population anticipated.

Current perception of county residents with regard to roads, retail opportunities, recreational/entertainment facilities and housing are discussed in detail in Chapter 2 of the Site-Specific Analysis for Economics and Social Conditions.

Similarly, forecasts by city/county planners regarding likely changes in community services resulting from facility related population growth are presented in detail in the Economics and Social Conditions section of this report.

Recreation

Recreation in the tract vicinity is limited to dispersed seasonal big game hunting with whitetail deer being the predominant species harvested. Access depends on landowner consent and climatic factors. Although there are no recreation facilities in the tract vicinity, existing recreation facilities in the region (community camping and picnic areas, Fort Peck Reservoir, and Charles M. Russell National Wildlife Refuge) are expected to receive the majority of recreation demand from the projected population increase. The social attitude survey revealed a concern for existing recreation facilities. It was stated that an increase in population would hopefully result in the possible upgrading of

already marginal recreation facilities. This concern will be addressed with the expected recreation demand from increased population in the regional EIS. There is no wilderness in the area.

Wildlife/Fisheries

Impacts of a gasification facility on wildlife in the Bloomfield tract area could occur in two areas: 1) impacts from destruction of habitat and 2) direct and indirect impacts from the increase in human population.

The removal of vegetation for a 960 acre gasification facility and the expansion of urban areas, highways, and railroads would prevent or reduce the use of an area by wildlife regardless of the type of vegetation removed.

All significant wildlife values cannot be assessed until wildlife inventories on and around the tract are completed in October, 1981. It is known that essential mule deer habitat occurs west of the tract and valuable white-tail habitat lies south. A facility located east of the tract would likely reduce the potential impacts to wildlife.

If powerlines, pipelines, access and haul roads are constructed in key wildlife areas, partial or total destruction of habitat would occur depending on the magnitude of development. The worst case would destroy present wildlife populations in the area. Wildlife oriented recreation such as hunting and wildlife observation would have to be sought elsewhere. Wildlife would be impacted by eagle electrocutions on powerlines, migratory bird mortality from striking powerlines close to wetlands, road kills along transportation routes through important wildlife areas, harassment of wildlife by off-road vehicle use, increased poaching, as well as habitat destruction.

Poaching and road kills have increased dramatically in areas of North Dakota, Montana, Wyoming and Colorado where energy development has occurred. The problem is compounded in areas where transportation corridors are located in important wildlife areas and shift changes coincide with wildlife feeding periods. This situation could occur in the Bloomfield tract area.

The impact to wildlife could be mitigated by: 1) siting the gasification plant and associated facilities with regard for critical wildlife areas, 2) adjusting work shifts to avoid feeding times of highly visible wildlife, 3) mass transportation of employees, 4) providing funds to State fish and game agencies to better control illegal shooting of wildlife, and 5) adopting a poaching clause in union contracts.

The amount of water withdrawn from the Yellowstone River for a gasification facility with off-channel storage is not considered significant enough to affect fisheries.

The cumulative increases in industrial, urban and other water uses will dictate the severity of the impacts on fisheries. The cumulative impact will be addressed in the regional EIS to be prepared.

Cultural Resources

The Bloomfield tract area has not been inventoried to date. Information from existing inventories (BLM unpublished data, Davis 1976; Greiser, 1980) outside the Fort Union coal region suggests that the predominant prehistoric sites should be lithic scatters of varying size, density and function (ca. 70-80%). Other expected prehistoric resources include stone circles (ca. 10%-20%), ceramic bearing sites, rockshelters and kill sites (ca. 10% combined). Expected historic resources include homestead and ranching remains (ca. 50%), historic graffiti and rock art (ca. 20%), freight roads, dugouts, cairns, trading pots, burials and battle sites (ca. 30% combined). Further information on cultural resource occurrence, distribution and significance cannot be quantified prior to inventory.

Visual Impacts

Eastern Montana has very high but common visual quality. In the absence of other types of visual experiences, the landscape is not highly valued as scenery because of the vast distances involved in crossing this relatively uniform area. Most highways roll with the landform so views alternate between nearby features at low points and panoramas of up to thirty miles at high points in the roadway profile. The landscape is seen in terms of these short vistas of landscape elements that will not be seen again, and short duration views of distant landscapes in which any vertical object or landscape feature serves as a focal point.

Large structural features in the Eastern Montana landscape contrast with the landscape both in terms of the visual surface (the character of what is seen) and in terms of function. Vertical and linear components of a facility, because of hard architectural edges of the structures, and the transitory nature of panoramic views imply a visual importance of these large objects for orientation. The aesthetic response is secondary to this visual function.

Neglecting cultural bias, the aesthetic response to stark architectural lines and pure planes of color contrasting with the simple curvilinear landforms of the countryside can be considered positive. This visual experience would be immediately comprehensible and would provide relief from a relatively uniform countryside. Beyond this initial response, however, are responses with origins in cultural bias and the individuals' relationships to the land. The greatest effect would be upon local residents with memories of the existing landscape to use as a comparative basis of judgment. If no attachment to the existing landscape is present, the facility would be judged more on its quality than on cultural bias.

The visual impact would be the penetration of the skyline by the facility in views from communities and major transportation corridors. The 500-foot stack could

potentially be seen thirty or more miles away. The facility would be highly visible and would demand a response either positive or negative. The dominance of the facility in the landscape could be perceived as a loss of amenity through impairment of the landscape as it now exists for the forty years of the facility's expected life.

Economics and Social Conditions

Construction and operation of the Bloomfield facility would result in impacts upon services in some communities within the areas as a result of population growth associated with employment opportunities. Figure 3 shows forecasted community employment and population levels through 2000 both with and without development of the facility. As these figures show, Glendive, Lindsay, West Glendive, Richey, Circle, Lambert, Bloomfield, Sidney, Fairview, and Savage would experience increases in both population and employment as a result of development of this facility.

FIGURE 3

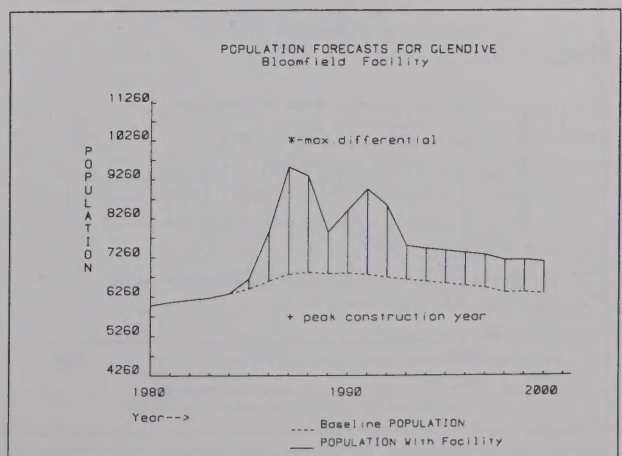
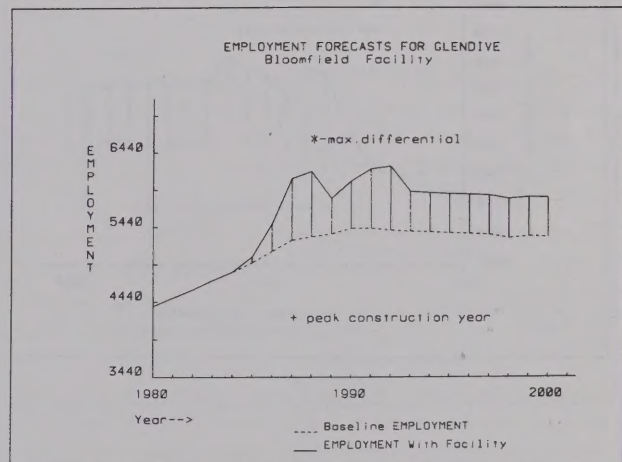


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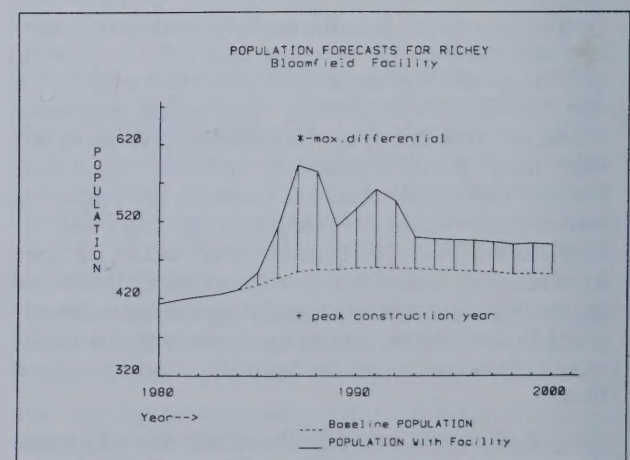
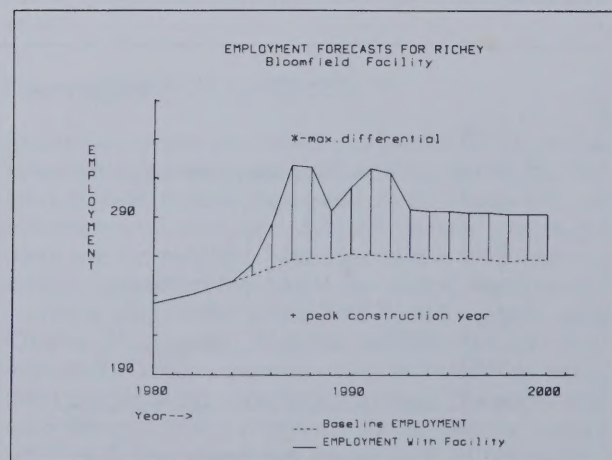
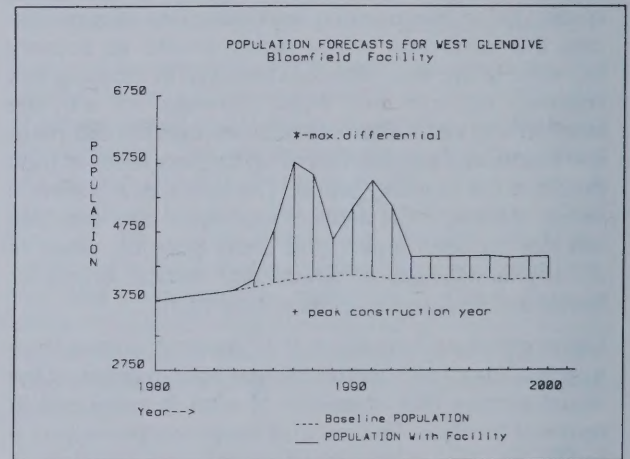
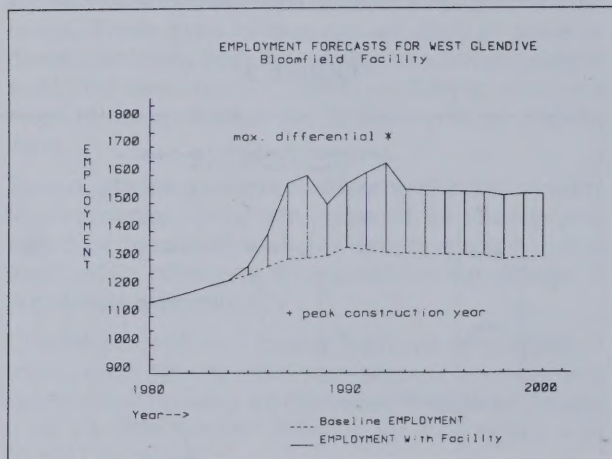
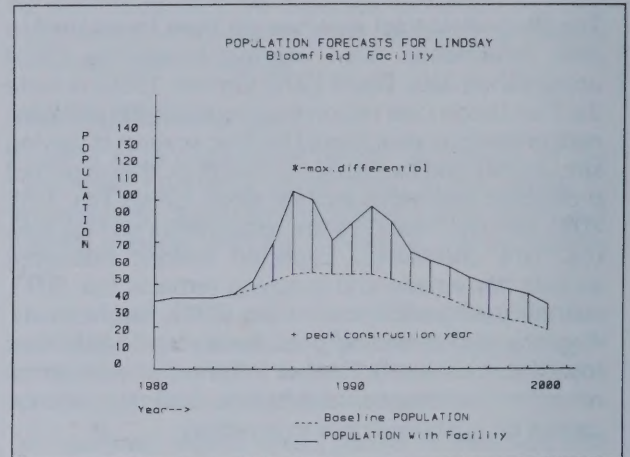
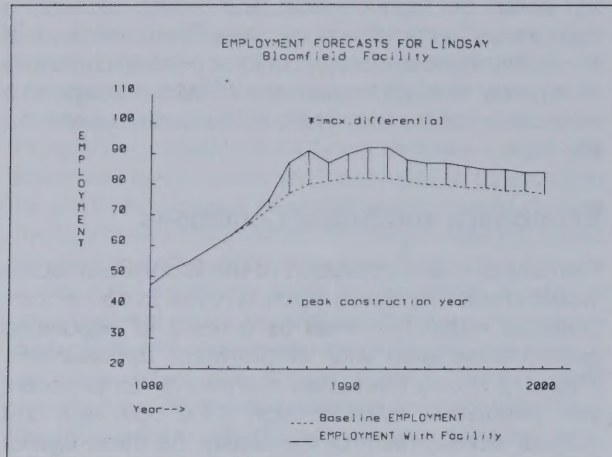


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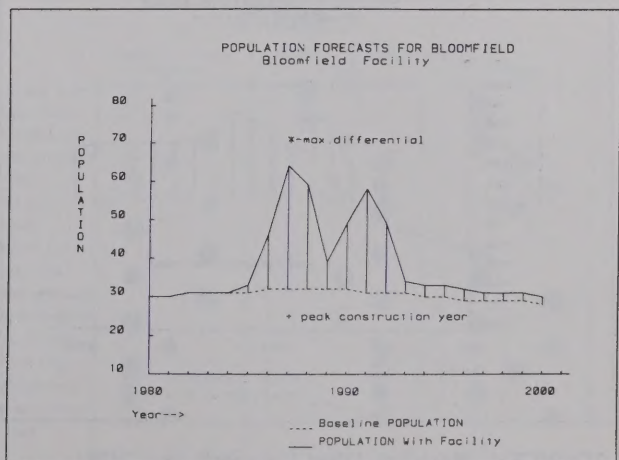
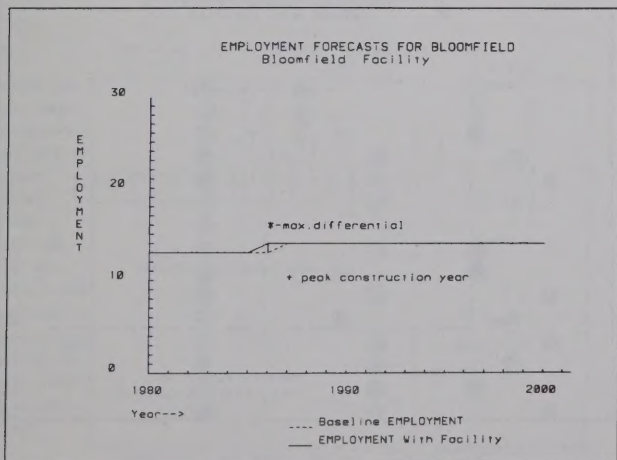
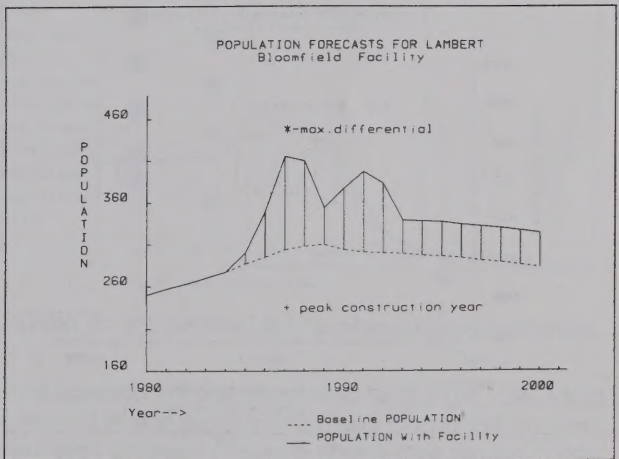
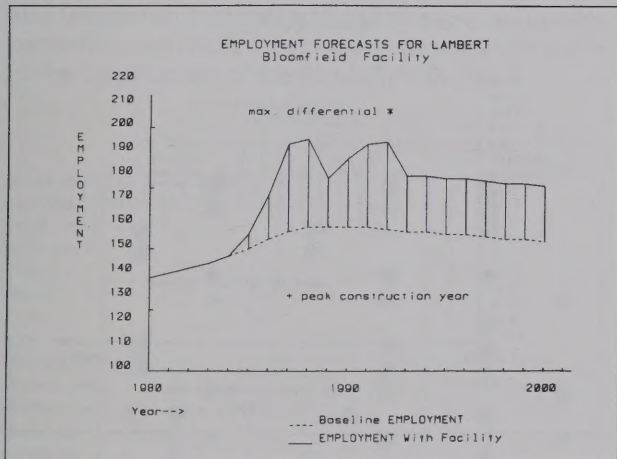
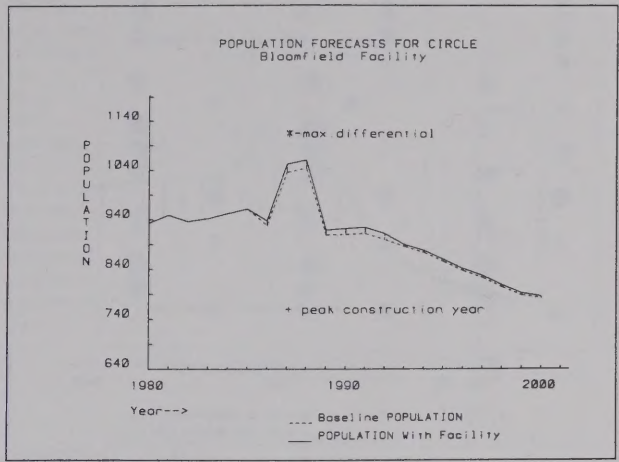
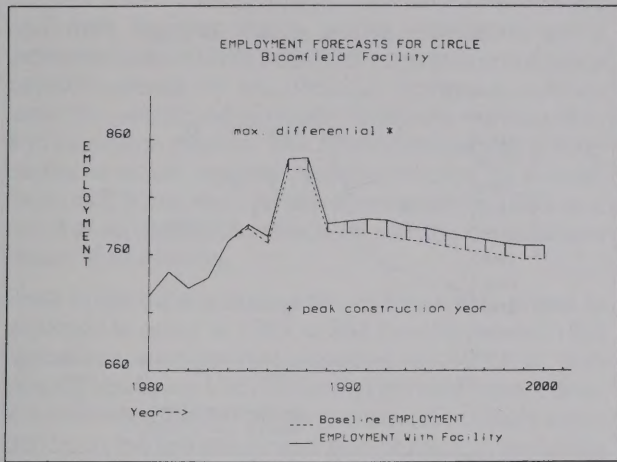
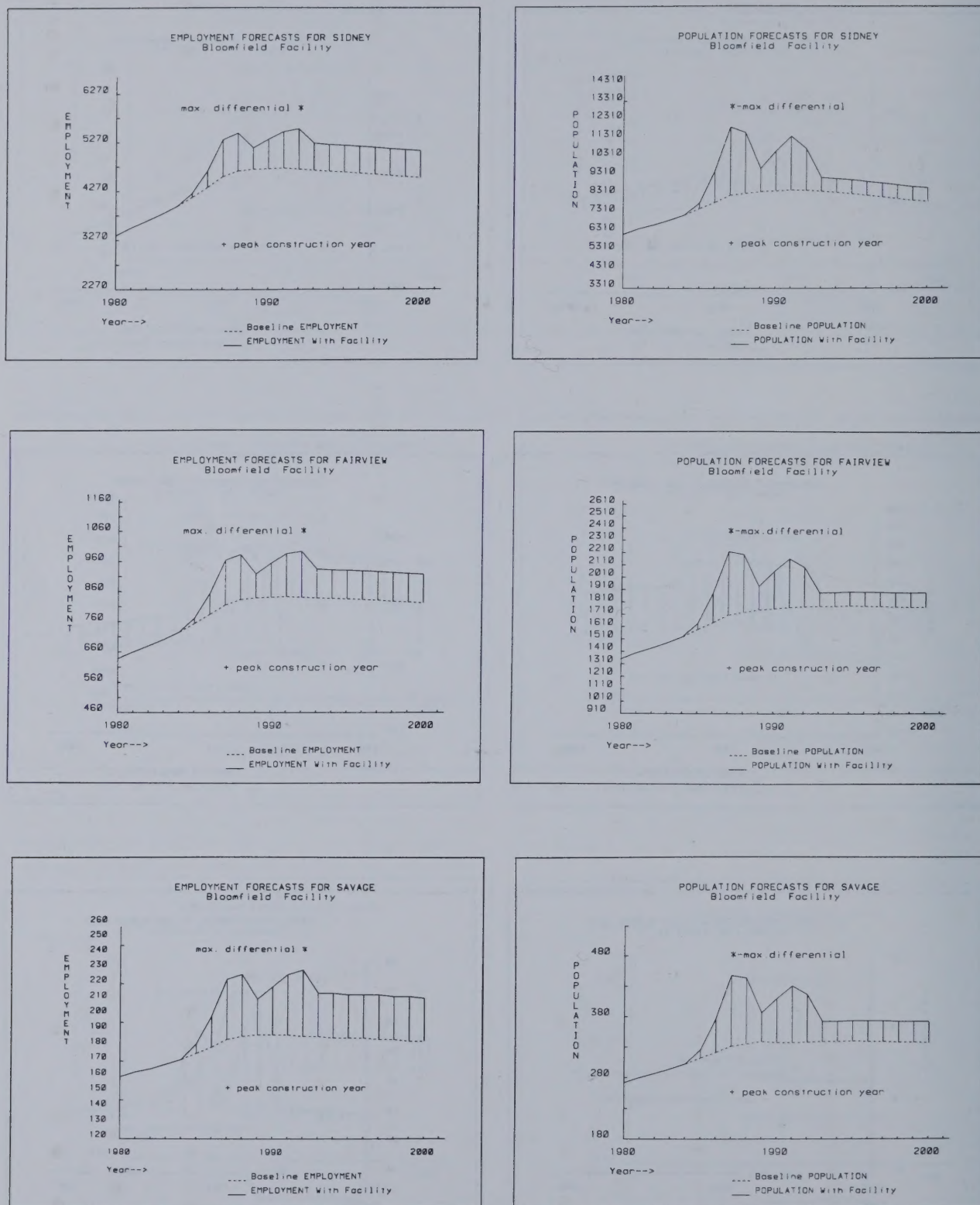


FIGURE 3 (continued)



SOURCE: Mountain West Research, Inc., 1981.

Changes in regional personal income from facility development are expected to be insignificant through the year 2000. The communities in which the workers and their families reside would experience some increases in economic activity as a result of employee's payroll expenditure and through company expenditures for goods and services during the construction and operation phases. The Bloomfield facility is forecasted to boost regional personal income by a maximum of 2.9 percent over baseline values by 1993 as a result of expenditures associated with the construction phase of this facility.

Peak employment during the construction phase is expected to occur in 1987 at 2617 employees with full operations employment expected in 1993 at 900 employees. Using 1987 as the first primary impact date, it is estimated that the above communities would experience an inadequate level of one or more community services as a direct result of the 1987 peak construction employment/population levels associated with construction of the facility (Figure 4). Glendive, for example, is forecasted to face inadequate sewage collection and treatment, water supply and storage, and police protection as a result of population growth attributable to the construction of the Bloomfield facility.

FIGURE 4

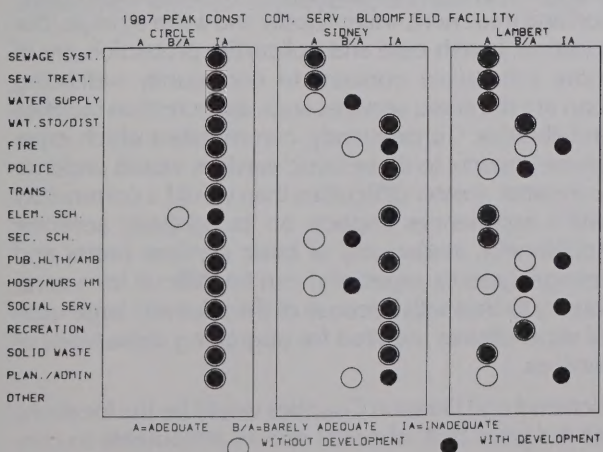
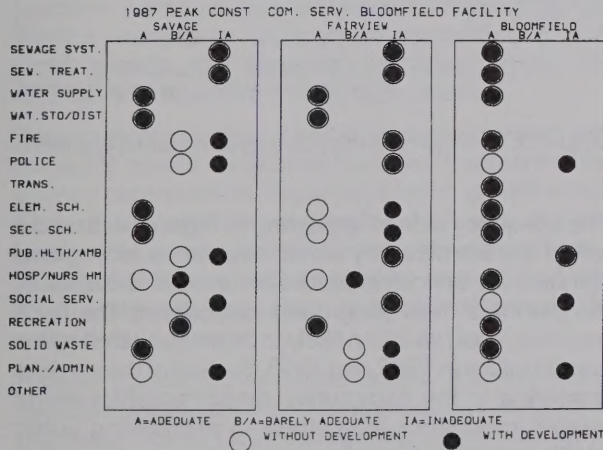


FIGURE 5

SOURCE: Respective city/county or regional planners.

Full operation of the Bloomfield facility (i.e., 1993 and beyond) is also expected to result in impacts on communities services. Figure 5 shows that Savage, Glendive, Sidney, Lambert, and Fairview would experience inadequate services as a direct result of the population influx resulting from facility operation. Additionally, the

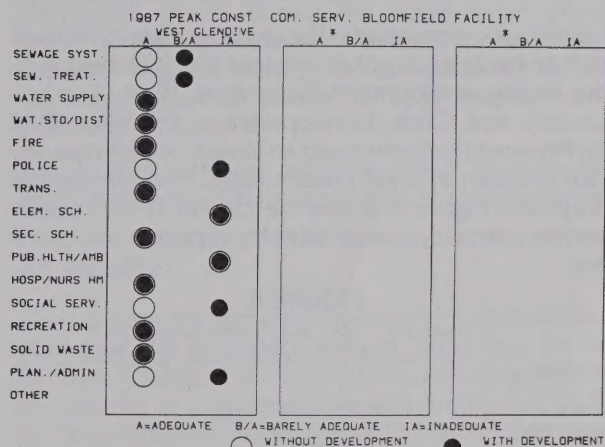
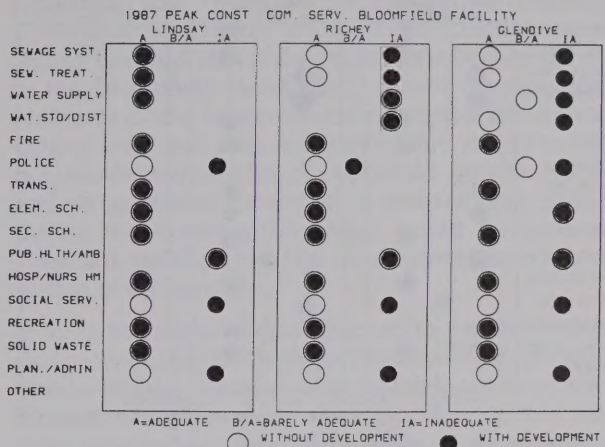
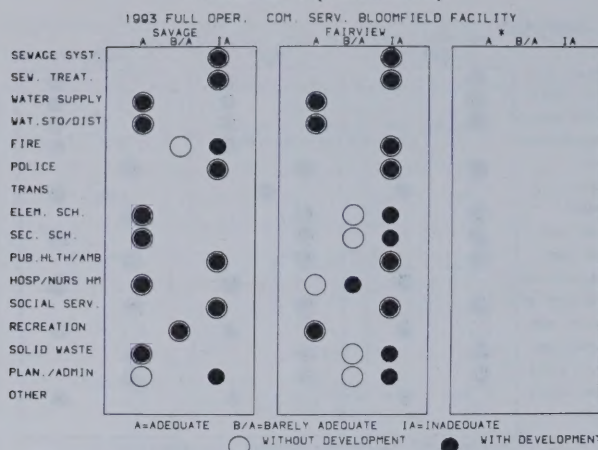


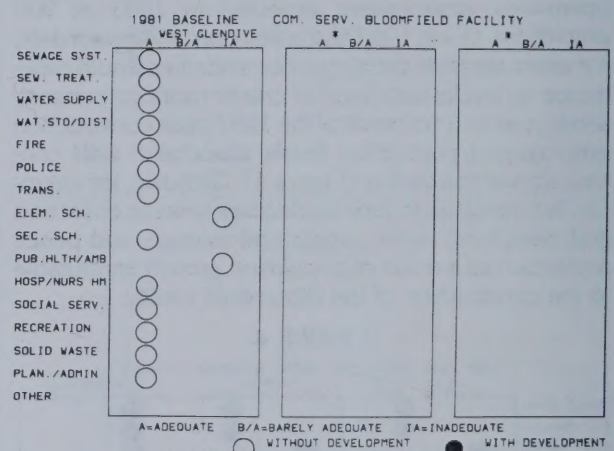
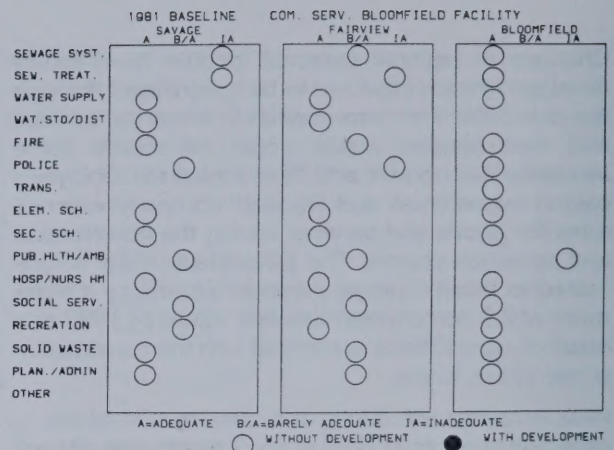
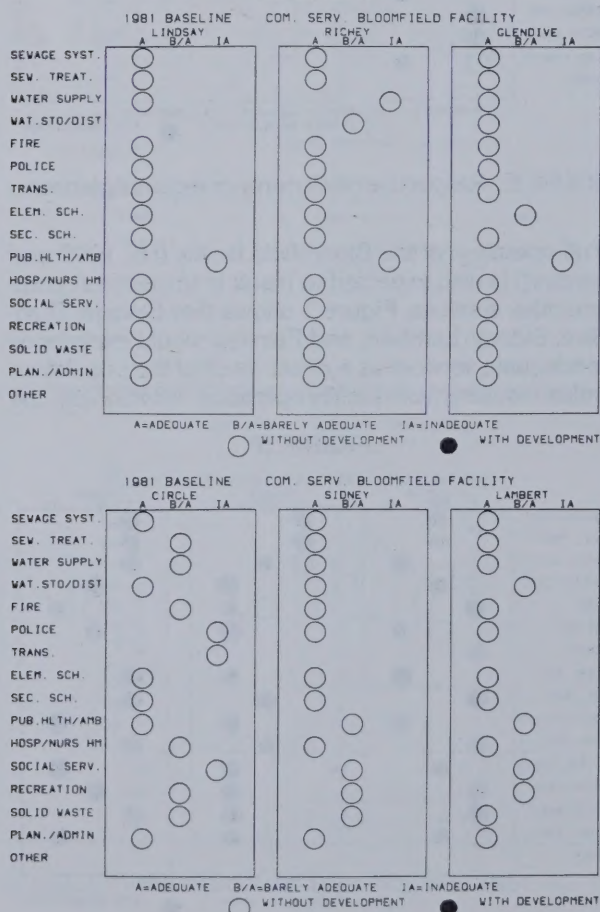
FIGURE 5 (continued)



SOURCE: Respective city/county or regional planners.

following communities in the study area are forecasted to face inadequate public services by 1993 even without facility development: Bloomfield, West Glendive, Lindsay and Circle. Development of the Bloomfield facility would further worsen an already inadequate service situation in these communities. For comparison purposes, Figure 6 shows the current (1981) public service adequacy assessments for impacted communities.

FIGURE 6



SOURCE: Respective city/county or regional planners.

The adequacy ratings appearing in Figures 4, 5, and 6 reflect assessments by either city-county or regional planners for the communities involved and constitute the planners' best judgments concerning the fiscal (revenue/cost) situation likely to be encountered by the communities in 1987 and 1993. Several of the services appearing in the community service graphics are of greater importance than others in maintaining public health and safety. Basic services such as sewage collection and treatment, water supply and water storage/distribution, health care and police/fire protection are of more immediate concern to community well-being than are nonbasic services such as recreation facilities and libraries. Consequently, communities which experience impacts to these basic services would undergo somewhat greater difficulties than would a community which experiences impacts on its nonbasic services. Additionally, inadequacy of basic services (water and sewage systems especially) can be difficult for a community to deal with because of the relatively large capital expenditures required for upgrading these types of services.

Richland and Dawson Counties would be the locations for the great bulk of social effects attributable to con-

struction and operation of the Bloomfield facility. In these two counties, BLM contacted sixty-eight residents and asked them for their thoughts on coal conversion facilities in their area. In the two county area, about two-thirds of the persons contacted supported local coal conversion either with or without qualification. Roughly one-fourth of the residents expressed opposition to the construction of a facility in the area. Within both counties the major concern attached to development was the possible degradation of the existing air quality.

Community leaders interviewed in Richland and Dawson Counties were unanimously supportive of facility siting in the area, but expressed concern toward both potential air quality problems and the local social consequences of rapid growth that would be tied to construction of such plants.

Some persons in Dawson and Richland Counties would be in a position to take advantage of plants locating in the area. Included are workers who either possess or could acquire marketable skills in the industry, some local retail merchants, and persons who would otherwise be outside the labor force, but would be able to enter this job market. These persons would benefit from an expanding employment market. Residents not possessing these characteristics would be unable to capture economic benefits but would face an altered community situation, characterized by very rapid growth and instability (at least during the employment intensive construction phase).

Respondents in Richland and Dawson county were very favorable toward the existing social environment of the various communities. Rapid population growth would likely result, particularly during the short-term, in a less personable, less predictable community atmosphere. It is likely that these persons would be less satisfied with their communities as a place to live than they would be without development.

Relative to other communities on the Northern Plains, Glendive-West Glendive (Dawson County) and Sidney (Richland County) are heterogeneous, have had some experience with industrialization, and are fairly large in

population size. These two cities, along with outlying communities in Dawson and Richland Counties, would receive the great bulk of the population effects attached to the Bloomfield facility. Still, growth management problems during the construction period at the city and county level would be substantial due simply to the magnitude and rapidity of population growth. Social and administrative capacities to deal with this growth during the construction phase would be severely stretched, stability would be reestablished upon completion of construction.

In sum, the social effects attached to the Bloomfield facility would fall primarily in Glendive-West Glendive and in Sidney. Because of their relatively large size, these communities are in a better position to deal with rapid growth than others in the region. Yet the scale of population growth during the construction phase would be very significant and result in social (family, political, religious, leisure, and occupational) disruptions that would be evident to both long-term and incoming residents.

Technical reports are available which describe the methodology used in the economic or social analyses.

Air Quality

The introductory section on assumptions and variables discussed the air quality analysis conducted for the facilities. The result of the analysis is a determination of compliance or noncompliance with Ambient Air Quality Standards and Prevention of Significant Deterioration (PSD) Standards for Class I and Class II areas.

With the use of a screening dispersion model for emissions from a gasification facility sited on the Bloomfield tract, it has been forecast that the facility would not violate Montana or North Dakota Ambient Air Quality Standards and would not violate PSD Standards for Class I and Class II areas. The increased concentration levels for TSP, NO_x, and SO₂ resulting from the facility were forecast to be below the detectable level at the border of the Class I area of the Theodore Roosevelt National Park in North Dakota.

LIST OF SOURCES FOR THE PRELIMINARY FACILITY EVALUATION REPORTS

ITAT Construction Work Force Report for February 1981; Inter-Industry Technical Assistance Team, Basin Electric Power Cooperative, Bismarck, North Dakota.

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The American Natural Resources Company, 1 Woodward Avenue, Detroit, Michigan 48226.

Final Environmental Impact Statement for the Great Plains Gasification Project, Mercer County, North Dakota. Prepared by the U.S. Department of Energy. August 1980.

Environmental Assessment of a Coal Gasification Complex in Dunn County, North Dakota. Prepared by the Natural Gas Pipeline Company of America.

Identification of Synthetic Fuel Impacts: A Preliminary Assessment. Prepared for the Montana Department of Natural Resources and Conservation by teams at the University of Montana and Montana State University. August 1980.

Montana Energy Almanac. Prepared by the Montana Department of Natural Resources and Conservation. October 1980.

West-Central North Dakota Regional Environmental Impact Study on Energy Development. Prepared by the U.S. Department of the Interior, Bureau of Land Management and the State of North Dakota. October 1978.

North Dakota State Department of Health; Bismarck, North Dakota.

Montana Department of Natural Resources and Conservation; Helena, Montana.

The Tenneco Coal Gasification Company; P.O. Box 491, Glendive, Montana 59330.

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